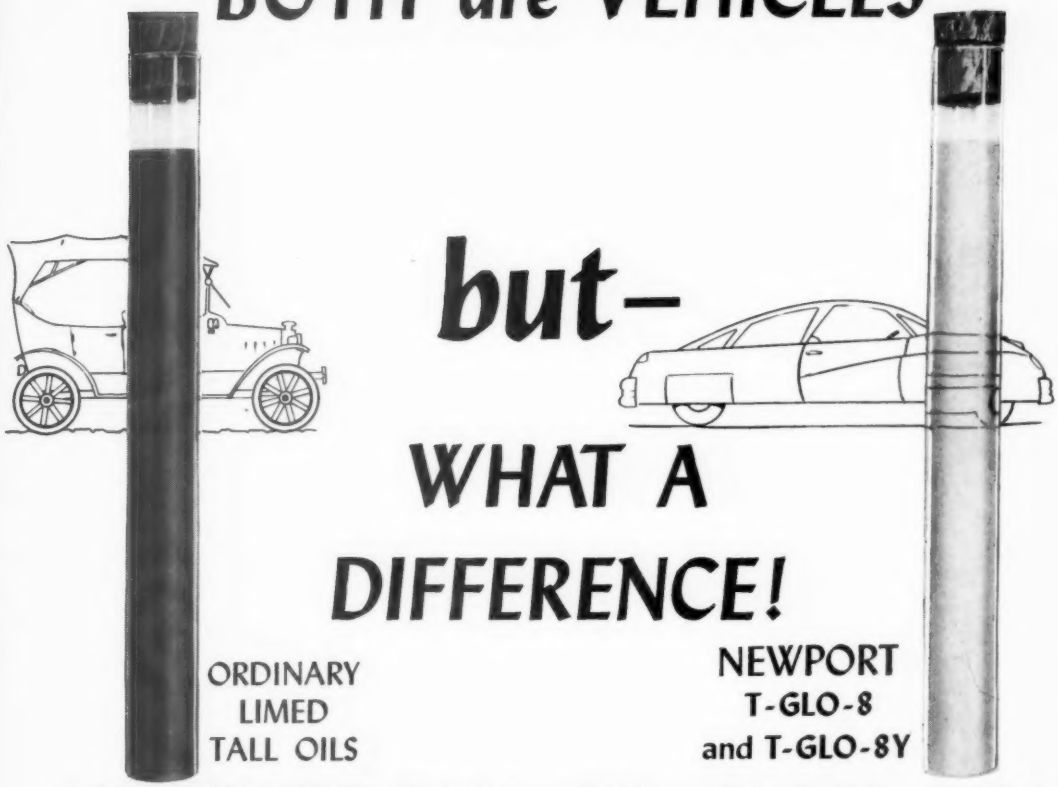
PAINT and VARNISH Production

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES

BOTH are VEHICLES



but—

WHAT A DIFFERENCE!

ORDINARY LIMED TALL OILS

NEWPORT T-GLO-8 and T-GLO-8Y

NEWPORT TALL OIL GLOSS OILS

PALEST LIMED TALL OIL EVER SEEN

Newport now offers you Paler Tall Oil Gloss Oils than you have ever been able to purchase or make in the varnish kettle . . . and you CAN GET THEM in TANK CARS or in DRUMS.

Newport T-GLO'S dry right. The "bugs" are really removed. Saves you money on rosin, which is so costly today.

Why get all your drying from expensive bodied oils? Let the fatty acids in Newport's Tall Oil Gloss Oils show you a worthwhile oil saving.

You want easy grinding with good flow, minus objectionable sagging. Newport T-GLO'S bring these advantages. Write for a sample today.

NEWPORT INDUSTRIES, INC.

230 PARK AVENUE NEW YORK 17, N. Y.

To serve you best

RCI

follows a definition from WEBSTER'S—

de-cen'tral-ize—to divide and distribute

According to Webster, the word *decentralize* means to divide and distribute. And that's precisely what it means to RCI. For RCI, world's largest manufacturer of synthetic resins and one of the world's leading producers of chemical colors, holds a firm belief in the decentralized type of operation. RCI plants, warehouses, and sales offices are strategically located from coast to coast—in constant readiness to answer every call with quick, convenient, efficient service—*outstanding* service that pays off with rapid deliveries and handy technical assistance for RCI customers. Then, too, if a product is in short supply at one plant, RCI can furnish it from another . . . if one or more plants are shut down by strike or fire, RCI can still continue to operate. But why not find out for yourself? Just check the record and you'll agree—for synthetic resins and chemical colors your best buy is RCI.

REICHHOLD CHEMICALS, INC.

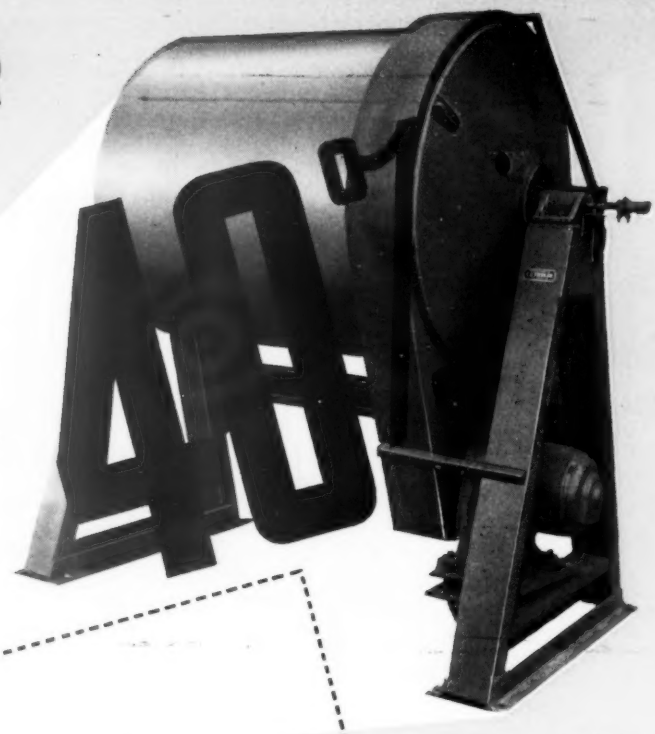
RCI

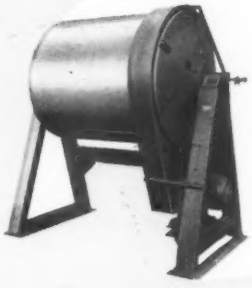
General Offices and Main Plant, Detroit 20, Michigan

Other Plants:
Brooklyn, New York • Elizabeth, New Jersey • South San Francisco and Azusa, California • Tuscaloosa, Alabama • Seattle, Washington • Chicago, Illinois
Liverpool, England • Paris, France • Sydney, Australia • Sassenheim and Apeldoorn, Holland • Naples, Italy • Buenos Aires, Argentina • Hamburg, Germany
Toronto and Port Moody, Canada • East London, South Africa • Osaka, Japan • Werndorf, Austria • Gothenburg, Sweden • Zurich, Switzerland

SYNTHETIC RESINS • CHEMICAL COLORS • PHENOLIC PLASTICS • PHENOL • GLYCERINE
PHTHALIC ANHYDRIDE • MALEIC ANHYDRIDE • SODIUM SULFATE • SODIUM SULFITE

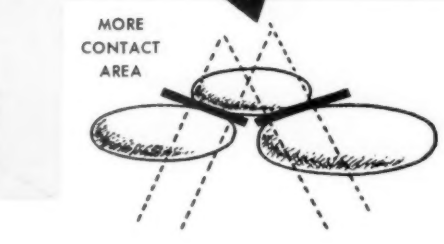
INCREASE YOUR PEBBLE MILL CAPACITY UP TO...





...by using COORS New NATURAL SHAPE Grinding Media of High-Density Alumina Ceramic

YOU CAN SEE THE SECRET



You can get up to 40% *more production* from your present pebble mill—*without additional costs.* Charge with Coors Natural Shape grinding media, designed specifically for the paint industry to *speed* dispersion. Actual plant records show mill production capacity can be increased up to 40%.

Costs and dispersion time are reduced for two reasons: 1. The Natural Shape gives maximum contact and grinding area, plus efficiency of a rolling sphere. 2. Coors high-density Alumina ceramic matericl, 38% heavier than ordinary pebbles.

Size No. 1 Size No. 2 Size No. 3

★ **Faster dispersion**—increased contact area, 38% higher density.
★ **Reduced cleaning time**—media always maintains smooth surface.
★ **Long life**—excellent wear resistance.
★ **No chipping or cracking**—Alumina ceramic has hardness and toughness of sapphire.
★ **No color contamination**—pure white ceramic.

Coors new Natural Shape Grinding Media of High-Density Alumina Ceramic is available in three sizes—⅞"x 1¼", 1"x 1¾", 1¼"x 2¼".

COORS PORCELAIN COMPANY
GOLDEN, COLORADO

National Sales Representatives

Landes, Zachary and Peterson,
272 South Santa Fe Drive, Denver 9, Colorado

COORS PORCELAIN COMPANY
c/o Landes, Zachary & Peterson
272 So. Santa Fe Drive
Denver 9, Colorado

☐ Please send information and samples of Coors Natural Shape Alumina Ceramic Grinding Media.

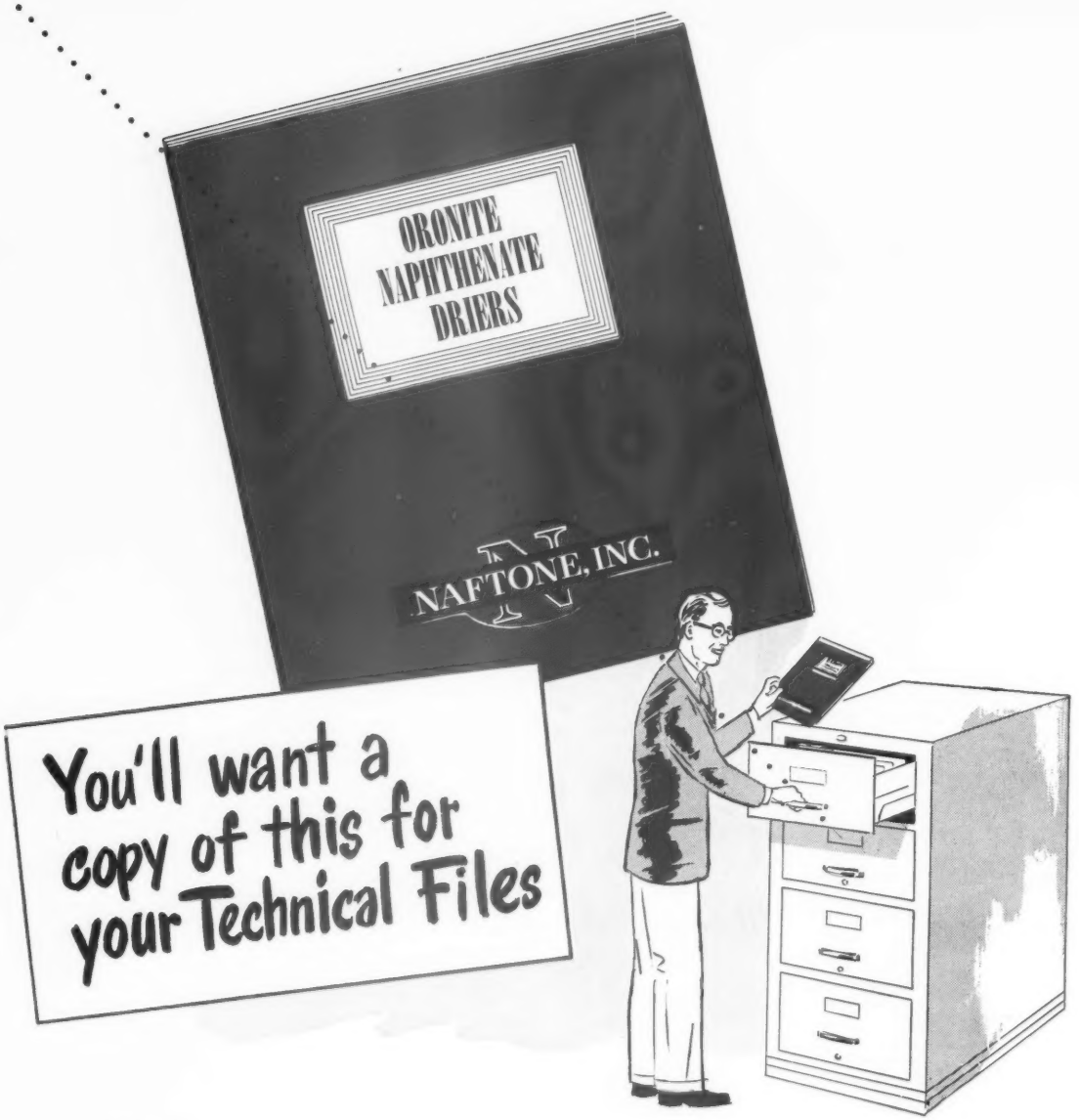
☐ Send information on Coors Spherical Grinding Ball of Alumina Ceramic.

Name_____ Title_____

Company_____

Address_____

City & State_____



WRITE today on your letterhead for a free copy of this up-to-the-minute, 16-page book on Naphthenate Driers.

Some indication of the scope of its contents may be obtained from the following chapter headings: The Story Behind Oronite Driers, Naphthenates Versus Other Type Driers, Oronite Drier Manufacture, Data Concerning Oronite Driers, etc.

Requests for copies of "Oronite Naphthenate Driers" should be addressed to Naftone, Inc., 515 Madison Ave., New York 22, N. Y.

NAFTONE, INC.

515 Madison Avenue New York 22, N. Y.

PAINT and VARNISH Production

Formerly PAINT and VARNISH PRODUCTION MANAGER
(Established in 1910 as The Paint & Varnish Record)

VOL. 41 JULY 1951 NO. 7

NEXT ISSUE

In August we will feature an article on the activities of the Paint, Varnish and Lacquer Section of the National Bureau of Standards. Such functions as research, preparation of specifications, technical advice, umpire testing in legal actions, pigment color standards, etc. will be covered.

FEATURES

Industrial Hygiene in the Paint Factory, *by Arthur C. Stern* 8

Vinyls for Surface Coatings, Part III, *by Walter J. Hanau* 12

Penetration of Protective Coatings by Marine Organisms, *by Dr. William F. Clapp* 17

Evaluation of Vinyl Coatings Subject to Immersion in Fresh Water *by J. L. Rohwedder and F. W. Shanks* 19

Raw Materials Report 38

DEPARTMENTS

Comment 7

New Products 24

News Digest 28

Patents 31

Technical Bulletins 36

Advertiser's Index 42

Published Monthly by
Powell Magazines, Inc.
Executive and Editorial Offices
855 Ave. of the Americas
New York 1, N. Y.
BRyant 9-0499

JOHN POWELL, *Publisher*
ANTHONY ERRICO, *Editor*
EDWARD R. DRAKE
Associate Editor
A. L. LYNCH
Circulation Manager
A. L. BENDER
Production Manager
DUNCAN P. MACPHERSON
EDWARD M. LYNCH
JOHN F. HYDE
Advertising Representatives
McDONALD-THOMPSON
West Coast Representatives

PAINT and VARNISH PRODUCTION is published monthly at 10 McGovern Ave., Lancaster, Pa., by Powell Magazines, Inc. John Powell, president; Ira P. MacNair, vice-president and treasurer; Alice L. Lynch, secretary. Entered as second-class matter, November 16, 1949, at the Post Office at Lancaster, Pa., under the Act of March 3, 1879. Subscription rates: United States and Possessions, $3.00 a year, $5.00 for two years, $10.00 for five years. Canada, $4.00 a year. Pan American Countries, $4.00 a year. All other countries $8.00. Editorial and business office: 855 Avenue of the Americas, New York 1, N. Y. BR-9-0499.

NOW!

A SOLVENT for ODORLESS PAINTS

Shell 410 E.P. Thinner

Available in substantial quantities for the trade

REPEATED USE of this type solvent in paints for stores, hospitals, hotels and homes has demonstrated that use by occupants *immediately after painting* is perfectly practicable . . . gone are objectionable odors that bring delays and complaints. A significant trend in this direction is already established in the industry.

We will be glad to send you additional information about Shell 410 E.P. Thinner. Samples for your evaluation will be sent upon receipt of your letterhead request.

SHELL OIL COMPANY

50 WEST 50TH STREET • NEW YORK 20, NEW YORK

SHELL

Clean Up Your Plant

LAXNESS by paint manufacturers regarding the appearance of their plants has prompted President Joseph F. Battley of the National Paint, Varnish and Lacquer Association to write to members of the Association urging them to set an example in the use of their products.

President Battley said—"From my visits throughout the country I have noted too many paint plants that do not use their products to beautify and protect their property as we urge others to do.

This is a serious reflection on the claims we make that the products of our industry are so essential to our national economy in peace and also essential to our efforts in a national emergency. I urge every member of the industry to initiate a personal Clean Up-Paint Up-Fix Up campaign. Not only will this improve the appearance of your home, plant and community but it will be a practical demonstration of public relations and your paint products.

There are, of course, the extra advantages of protection of plant and equipment, the improved working conditions and raising of morale of your employees.

Such a project could be an annual affair as we are the leaders in making America more paint conscious. We are proud of the products of this great industry. We should be equally proud of the plants that produce them."

In his letter, President Battley pointed out the importance of improving working conditions and raising the morale of the employees. In this connection we recommend serious reading of the article, "Industrial Hygiene in the Paint Factory" by Arthur C. Stern, appearing in this issue.

Since the paint industry uses a vast number of raw materials, there are likely to be some which may cause illness among employees handling them unless safeguards are provided and used. Mr. Stern is presently Chief of the Engineering Unit Division of Industrial Hygiene and Safety Standards of the New York State Department of Labor. His wide experience in the field of industrial hygiene is demonstrated in this article by providing you with sound and practical information on such factors as safeguards in handling toxic materials, dust exposure during mixing and ball milling operations, vapor control and general sanitation.

British Platers Turn to Lacquer

CURRENT shortages of nickel in Great Britain has caused the British Plating industry to utilize more lacquers in their finishing processes. Since complete ban on the use of nickel in plating is anticipated, British electroplaters are busy developing new processes and products to replace this scarce metal. One of these new processes uses copper deposits directly on brass, followed by chromium of standard thickness and, finally a hard synthetic lacquer of the melamine group. A process based on the use of bright-plate zinc has been improved by the use of lacquer in preventing tarnishing.

New Federal Color Card

COOPERATIVE movement by the National Bureau of Standards and the Federal Specification Board has finally resulted in a uniform means of indicating paint colors to be used by the Federal Government. The new Federal Color card for paints reduces the more than 600 paint colors formerly used by the Government to 187 by eliminating unimportant variations of different shades.

It is said that the various branches of the United States Government collectively form the largest single purchaser of paint in the world. The color card, which consists of actual spots of colors deposited on charts in a loose-leaf binder, is expected to contribute materially to government purchasing economies; paint suppliers will be able to supply paint more quickly and economically and the various agencies will no longer have the trouble and expense of maintaining their own color standards for distribution to bidders.

INDUSTRIAL HYGIENE IN THE PAINT FACTORY

BY ARTHUR C. STERN
Chief
Engineer Unit Division
Industrial Hygiene and Safety Standards,
New York State Dept. of Labor

INDUSTRIAL hygiene has been defined as "the science and art of preserving health through the recognition, evaluation and control of environmental causes and sources of illness in industry." It has been reported that about 2000 different raw materials are used by the paint industry, with as many as 600 of them being kept in stock by a single plant. Among such a large number of materials, there are bound to be some which will cause illness among employees handling them unless adequate safeguards are provided and used. Although the use of lead in paint has decreased markedly in the last decade, it nevertheless remains the most important health hazard in the paint factory and the material about which safeguards should center.

Arthur C. Stern

Ingestion of Toxic Material

TOXIC material enters the body in three ways: Ingestion, Inhalation and Skin absorption. By ingestion we mean allowing it to enter the gastro-intestinal tract by swallowing either some of the material itself, food contaminated by some of the material or mucous from the nose containing some of the material filtered out of the air breathed. Food contamination occurs not only by exposure of the food itself in a dusty workroom, but also by toxic dust carried on eating utensils, dishes, hands, hair and clothing, all of which may be transferred via the food to the mouth.

Ingestion of toxic material can be minimized if each paint factory using lead pigments or any other toxic powders adopt the following precautionary measures. (Note: Even if only non-toxic pigments are handled it is wise to enforce these regulations).

1. Storage or eating of food in the workroom should be prohibited.

2. A separate clean lunchroom should be provided. It should preferably be separate from the locker room.

3. A cap should be worn while working to prevent dust accumulation in the hair, and removed prior to eating to prevent dribbling dust from it onto the food.

4. Adequate and convenient washing facilities should be provided, and employees should be allowed a paid wash-up period before lunch.

5. Clean working uniforms should be provided, preferably daily but not less frequently than twice a week. Employees should be required to wear them at work but not be permitted to wear them home. Adequate locker space should be provided for storing both street clothes and uniforms, preferably separate lockers for each.

6. Adequate shower stalls should be provided and the employees encouraged to use them before changing into their street clothes.

7. Smoking and chewing tobacco or gum should be prohibited in the workroom.

8. The management should keep the workroom as dust-free as possible.

Inhalation—Inhalation of toxic material occurs whenever the worker breathes air containing toxic dust, gas or vapor. In the paint factory dust exposures occur primarily at the mixers, ball or pebble mills and varnish kettles, and in the handling of bags of pigments, extenders and resins for use in the mixers. A lesser exposure occurs in the handling and mixing of tinting pigments. (The dust problems of mixing and pack-

Toxic material enters the body in three ways—ingestion, inhalation and skin absorption, as illustrated above. Precautionary measures will eliminate or minimize these hazards and save not only health but man hours and tend to increase production. With 2000 different raw materials used by the paint industry, simple safeguards will help.

aging dry-mixed paints are beyond the scope of this discussion.)

The principal vapor exposures in paint manufacture occur at the reducing and tinting operations, in can filling, in cutting nitrocellulose and resins and in the cleaning of equipment with a solvent. Vapor exposures also result from leakage from pipe lines, meters, pumps, filters, etc. A small steady drip can allow a whole workroom's atmosphere to become charged with solvent vapor.

Skin Contact—Skin contact with liquids and dusts can occur in all paint manufacturing operations up to the point the cans are sealed. Contact with solvents, resins, oils, dyes and similar materials can cause dermatitis and skin sensitization. Workers required to clean equipment with solvent should protect themselves with rubber gloves and, where necessary, impervious aprons. Workers required to handle resins or dyes to which they are sensitive should be similarly protected. Overly sensitive workers should not be required to handle chemicals to which they are sensitized.

Personal cleanliness is the best safeguard against dermatitis. Therefore, the means recommended to prevent ingestion of toxic substances through the maintenance of clean hands, hair and body and the wearing of clean clothes are also the primary means of preventing occupational skin disorders. Although allergic reactions more serious than dermatitis, and even absorption into the blood stream, can occur as the result of skin contact with certain chemicals, these hazards are not of major significance in paint manufacture.

Dust Exposure

YEARS ago in paint plants, the major emphasis of industrial hygienists was on the prevention of ingestion of lead. Nowadays, major emphasis is on the prevention of inhalation of dusts containing lead or any other toxic element. The reason for this shift in emphasis is that although prevention of ingestion of contaminated food during the meal hour is important; prevention of inhalation of toxic dust during the more numerous working hours is considerably more important. Dusts may be toxic because they are absorbed by the blood in the lungs or because they cause the growth of fibrotic tissue in the lungs thereby impairing the lungs' vital capacity. Lead pigments and mercury salts are in the first category; silica and certain commercial varieties of talc are in the latter class. Certain alkaline and acid dusts have the ability to irritate the respiratory tract, but, fortunately, are not commonly found in paint plants. Whether or not dust is present in excessive quantity depends on its chemical composition, its size characteristics and the duration of worker exposure. Since a high concentration of any dust is a nuisance and makes for bad housekeeping, a good working rule is to control all dust sources regardless of the health hazard created.

Dust Sources—Materials Handling—This discussion is limited to the type of plant which receives its raw materials in bags and drums, predominantly the former, and which therefore does neither bulk material handling nor dry crushing and dry grinding. In any plant, visual evidence of dust on the floor, rafters, ledges, machinery, or in air shows where dust control is needed. Although points of dust dissemination vary from plant to plant, an overall pattern of most probable sources exists.

One damaged bag allowed to spill powder each time it is handled will leave a trail of dust throughout the warehouse and plant, ready to be stirred into the air by each footstep or truck wheel passing by. Personnel should therefore be instructed to place only undamaged containers into storage and to give special handling to damaged ones. A specific procedure should be developed for spill-free transport and quick utilization of damaged containers.

In general, plants which store and transport bags of raw material on pallets by means of lift trucks, disseminate less dust by material handling than those which pile bags on the floor. Piling on pallets keeps the floor open for both inspection and cleaning. Plants with good concrete floors are generally freer of dust than those with floors hard to truck over and to clean. Accessibility

and illumination of the storage area are both factors in their cleanliness. Dark, hard-to-get-at mezzanines are likely to be dustier than well lit, high ceilinged floor areas. Good floors permit the use of an industrial vacuum cleaner, the preferable method of floor maintenance in warehouse areas. Dry sweeping is the least desirable means of floor cleaning because, if toxic dust is on the floor, sweeping disseminates it into the air breathed by the porter.

Mixers and Ball Mills—The operations at a mixer or ball or pebble mill that cause dust dissemination are dumping bags, discarding empty bags and adding less than bag full quantities by means of a scoop. Once a mixer or mill has been loaded, it ceases to be a source of dust, since the latter is closed and, in the former, blade or can rotation before the pigments are wetted is too slow to disseminate dust.

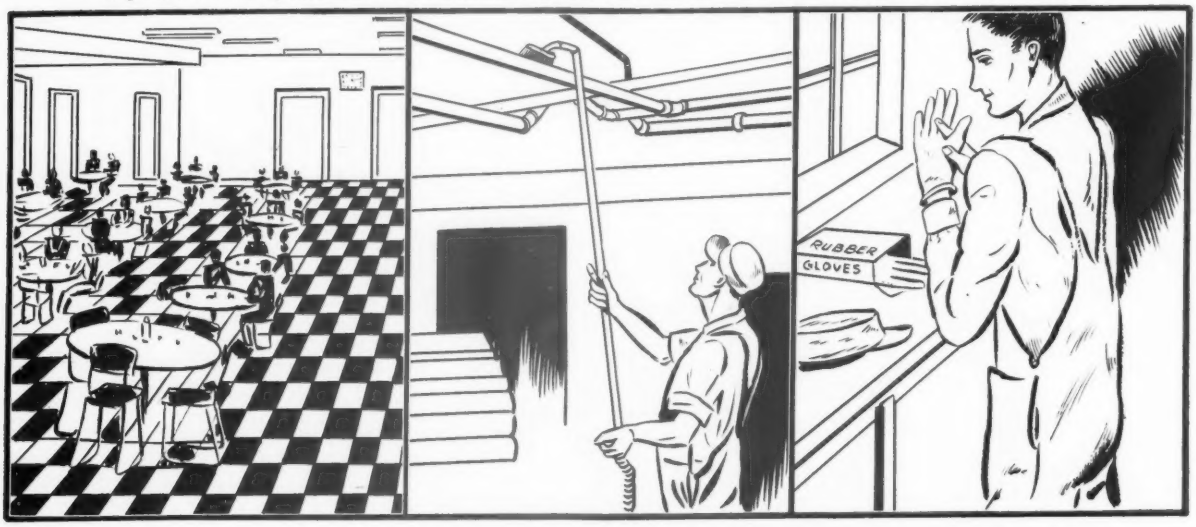
Slitting and emptying a bag into a mixer or mill disseminates dust for several reasons. First, there may be spillage onto the floor around the mixer or the mill feed spout, which spillage may be kicked into the air by men walking by. Secondly, there is the puff of dust which arises from the mixer or mill spout when a bag is dumped. There are two reasons for this puff: displacement from the mixer of a volume of air equal to the volume of solids added, and the escape of air entrained by both the downward fall of the powder and the upward flow of the displaced air. The very common habit of workmen of shaking bags or striking them against the side of the mixer or mill spout produces violent turbulent air motion and generally succeeds in disseminating into the air almost as much powder as is salvaged.

Handling and Weighing Powders—The use of an open bag or drum and a scoop to add less than bag-full quantities of powders to a mixer frequently disseminates dust out of all proportion to the quantity of material involved. Each scoop load must either have its excess material tapped back into the bag or drum, in which case a dust cloud arises from the container; or carried in the scoop, in which case it dribbles from it onto the floor as the scoop is carried to the mixer. Dumping the scoop load into the mixer again gives rise to a dust puff.

Scooping is more common in the mixing and weighing of tinting pigments and dyes than in the large batch mixing of white, green or yellow paints and therefore may involve relatively small quantities of quite toxic materials, such as certain dyes, anti-mildew and anti-fouling agents, germicides and insecticides used as additive agents to paints. Where there is any doubt as to the ability of the production personnel to handle such materials safely, they should be weighed, mixed and dispersed in a vehicle in the laboratory (under the laboratory hood if necessary) so that there will be no dust exposure to these materials in the factory. Where this is not practicable, the drums or cans of the more toxic materials and the scale should be all enclosed in an exhausted, lighted open front booth so that any dust formed is ventilated out of of the workroom and away from the employee handling the scales.

Dust Control at Mixers and Ball Mills—The dust control best suited for mixer and ball mill loading is exhaust ventilation by means of specially designed hoods over the top of each mixer and of each ball mill loading spout. Open top mixers should first be fitted with covers having hinged sections for access. A rectangular opening should then be cut out of the front portion of the cover slightly wider than a bag, if only bags are to be emptied into the mixer (or wide enough to take a drum or barrel if either is to be dumped into the mixer). The depth of the opining depends somewhat on the diameter of the mixer, being affected by the curvature of the front of the cover. For most cases, this depth need be no bigger than 18 inches for bag dumping nor than the diameter of a drum or barrel for barrel dumping. Vertical side and rear sheets of metal extending up at least a foot above this rectangular opening and terminating at the opening complete the hood. By keeping the top open handling bags is made easier. The fronts of the sides may also be rounded off on top for the same purpose. The front of the hood is permanently open. In the preferred method of control, a downward air velocity of about 200 ft. per

A separate, clean lunchroom should be provided, separate from locker room and free from dust and fumes. Regular cleaning of the "dust collector" nooks and crannies is imperative. A cap and rubber gloves are definite adjuncts for the prevention of accumulation of dust in the hair and the absorption of toxic material.



minute is maintained through this rectangular opening in the cover by taking an exhaust pipe connection from the rear cover. Thus for a 2½ ft. by 1½ ft. opening, 750 cfm of air would be required. To avoid the possibility of sucking out any raw materials from the mixer, a "bug-a-boo" in the minds of many executives considering exhaust systems, it is only necessary to keep the upward air velocity in the exhaust pipe connection to the rear cover so low that such loss of material cannot possibly occur. This is accomplished by using a long converging connection upward from the rear cover (at which level the upward velocity would be several hundred feet per minute) to the 6 inch exhaust branch pipe (where the velocity would be of the order of four thousand feet per minute).

As an alternate to the foregoing, a lateral draft hood may be built over the load opening of the mixer. This type hood must also be employed at floor level chutes to ball mills on the floor below. Exhaust of from 1000 to 1500 cfm per hood is needed for effective dust control. A fan, a dust collector and a discharge duct to the outer air complete the exhaust system.

Vapor Control

THERE is generally no vapor problem at the mixers and very little at the mills. The fact that milling raises the temperature of the paste being milled occasionally creates a vapor problem with formulations containing a vehicle component that will evaporate at milling temperature. An exhausted hood over the mill used for this job will control the vapor produced. The principal source of vapor in a paint plant is from open top reducing tanks and change-can mixers, where thinning and tinting are done in cans or tanks having a large evaporating surface area open to the workroom air. When paint cans are filled from these open-top vessels, the employee so engaged may find himself in an atmosphere having too high a vapor concentration, primarily caused by the can from which the filling is being done rather than the relatively small surface area of the cans being filled. However, if an open cloth filter is used between the large vessel and the cans being filled, a source of evaporation is brought close to the employee's nose. This is an unsafe practice and should be avoided. Closed filters should be used whenever filters are needed.

All rooms where can filling or reducing operations take place should be provided with room supply and exhaust ventilation. The ventilation rate depends on the types and intensity of operations in the workroom. Churn rooms are also ventilated to keep the solvent vapors from spreading throughout the factory. This generally involves exhausting the room to the atmosphere while taking the air supply from the adjacent workrooms in the factory. Air supply taken from outdoors must be heated in winter and so introduced to the workroom that no draft is created.

The above discussion refers particularly to paint manufature. In varnish making, the reducing of open kettles is best done under an exhausted hood.

Lacquer Making—In lacquer manufacture, the use of open-top mixers or cans and of open mills should be restricted to the incorporation of solids into an oil or varnish vehicle prior to mixture with the nitrocellulose solution. Since such operations are identical with the paint making operations already discussed, the same precautions and control means apply. All operations involving the cutting, reducing, pigmentation, tinting or storage of nitrocellulose and nitrocellulose solutions should be conducted in closed-top vessels and the workrooms should be well ventilated. Occasional operations involving open-top vessels should be locally hooded and exhausted as should filtering and can-filing operations. With properly designed hoods, a control velocity of 100 ft. per minute into the hood will usually suffice.

Varnish Making—Modern varnish and alkyd-resin kettles are connected to a fume exhausting and scrubbing system so that there is an inward flow of air into the kettle from the room. This air flow provides dust control when filling the kettle. Open kettles over open fires are inherently well ventilated by chimney action. At least one of the more toxic solids added to varnish kettles is available in pellet form to still further limit dust exposure. Note has already been made of the need for vapor control when thinning open kettles of varnish.

Respirators—Respirators are masks worn over the nose and mouth to allow a worker to inhale safely when he is working in a contaminated atmosphere. Respirators are primarily intended to protect workers in emergencies, while doing cleaning and maintaining of equipment, and in the performance of operations conducted only occasionally. They are not intended to be worn continuously throughout a workday nor to protect workers performing operations exposing them to contaminated air for a number of hours per day. Respirators are uncomfortable to wear and breathe through even when they are clean and fitted with new filters. They are even more uncomfortable when they get dirty and when a clogged filter or cartridge increases the energy that must be expended in breathing. This is particularly true on a hot day when the wearer is perspiring freely. Respirators should not be used as a substitute for dust control by exhaust ventilation, good housekeeping and similar means.

When respirators are used, the following precautions should be observed:

1. Only respirators, approved by the United States Bureau of Mines for the type of service intended, should be used in potentially dangerous atmospheres.

2. The respirator should be kept in a clean place between periods of use. Respirators hanging on hooks or lying on machines in the workroom will get contaminated by dust or vapor in the workroom atmosphere.

3. The management should assume responsibility for keeping respirators clean, sanitary and supplied with clean filters or cartridges.

A factory devoted to the manufacture of materials to clean, brighten and protect our homes and structures should itself be a clean, bright and protected place to work. If paint manufacturers will study their own advertising literature and make their factories as spotless and dust-free as the workrooms their advertising illustrations disclose, the chances for their workmen contracting occupational diseases will be at a minimum.

VINYLS

For Surface Coatings

Part III

By

WALTER J. HANAU, Chemical Engineer

Medium-Polarity Polymers

COATINGS of acrylic ester base are outstanding for their chemical and solvent resistance, but especially for their high light transmission and their resistance to discoloration under the influence of heat or ultra-violet, and aging resistance in general. Besides other uses, they find application in fabric impregnation, which greatly increases the abrasion resistance of the fabric so treated.

The commercial acrylics comprise polymers and co-polymers of acrylates $H_2C{=}C(H){-}COOR$ and methacrylates $H_2C{=}C(CH_3){-}COOR$. The methacrylate ester of any alcohol produces a tougher and harder polymer than the corresponding acrylate. However, in either group, increasing chain length of the alcohol residue (R in above formulae) results in softer and more flexible polymers. Thus, methyl methacrylate polymers produce the hardest, toughest films of this class of materials. Polymerization conditions greatly influence polymer characteristics. Most commercial grades are said to be co-polymers. They are described as possessing perfect transparency and water-whiteness with no discoloration at high temperatures, excellent resistance to water, chemicals, chemical fumes, alcohols and oils, very low pigment reactivity, and excellent flexibility and adhesion to various types of surfaces, especially for the softer grades. The acryloid resins (Rohm & Haas Company), marketed in solution form, range from a hard, tough grade showing maximum solvent resistance (A-10) to a very soft, flexible grade (C-10), with grades of intermediate hardness, B7 and B-72 (the latter being a lower-viscosity grade than the former). They can be diluted with aromatic hydrocarbons, ketones, esters, and chlorinated solvents. A special resin (F-10) of somewhat higher hardness than C-10 mentioned above, is mineral-spirits soluble; naturally, this grade does not show the oil resistance of the grades discussed above.

Solvents given as above (for regular grades, not mineral-spirits soluble). Aromatic hydrocarbons are stated to produce the lowest-viscosity solutions, with a further viscosity drop resulting from use of alcohols as diluents. Esters of alcohols of 4 or more carbon atoms generally yield mineral-spirits soluble polymers.

The various grades of acrylics described above possess only limited compatibility with each other. They are stated to be compatible with nitrocellulose and ethyl cellulose, giving excellent ultra-violet discoloration resistance with the former. Formulations of white enamel using B-72 with vinylite VMCH (10% of

In this, the third article relating to the important topic of vinyls for surface coatings, the author discusses medium-polarity polymers in all their aspects and uses. Part I, February issue, covers theoretical aspects emphasizing the polymer structure and its effect on the properties of the resin in question. Part II, May issue, deals with the characteristics and properties of various vinyl resins.

latter on basis of total binder) are recommended for a tough, adherent baking finish. A-10 with vinylite copolymers is mentioned for fabric coatings. The mineral-spirits soluble grade, F-10, usable as an overcoat over oil paints because of its aliphatic thinners (no lifting), is stated to produce a fumeproof white enamel in a formulation containing low-viscosity Parlon (chlorinated rubber). Baking temperature specified for A-10 resin is 300–400°F. Too low a temperature is said to result in insufficient hardness, while above 400°F, blistering due to decompositions results. Excessive baking times do not produce discoloration. Baking time specified for the softer resin grades are lower.

Several uses of acrylics with vinyl chloride-vinyl acetate copolymers are of interest. In exterior finishes, the inclusion of methyl methacrylate decreases chalking as compared to a straight vinylite copolymer finish, and gives a tougher film than straight acrylic resin. Another use, the incorporation of n-butyl methacrylate into heat-stabilizing primers, will be described. Addition of VMCH is said to improve the adhesion of acrylic coatings to smooth surfaces, e.g. chrome plate, and also to improve sprayability. Compatibility tables indicate that C-10 is incompatible with VYHH copolymers. F-10 incompatible at less than 4 parts VYHH to 1 part F-10; other resins show wide compatibility.

Acrylic resin emulsions marketed as Rhoplex are claimed to have good stability. The 3 grades available, ranging from tough, horny resin to a very tacky substance, can be blended with each other or with latex. The films from these latices show various degrees of swelling, as well as blushing, in aqueous liquids. Otherwise, their resistance characteristics (solvents etc.) are the same as those of the solution-deposited resins. The emulsions are used for base coatings on glass and rubber; paper and fabric impregnants, and in adhesives.

The Hypalon line of acrylics (DuPont) consists of methacrylate polymers; methyl (P1); ethyl (P2); n-butyl (P4); isobutyl (P5) and 50/50 n-butyl/isobutyl methacrylate (P6).

Viscosity, hardness, tensile strength and heat resistance are highest for P1 (methyl ester) and lowest for P4 (n-butyl ester). These are supplied as granular solids. Toluol produces the lowest viscosity solutions at given solids content, with further decreases in viscosity when part of the solvent is replaced by methanol; the minimum viscosity appears to be between 20 and 30% methanol in the solvent mixture. Wide compatibility (i.e. all grades of Hypalon, at widely varying proportions) exists with the commonly used ester plasticizers and with polyvinyl chloride, vinyl chloride-vinyl acetate copolymers, cellulose nitrate (½ sec.), chlorinated diphenyl, coumarone-indene resin, rosin, and Beckacite Super 2000 (a phenolic). The higher esters only (P4, P5, P6) are compatible with ester gum; P1 is compatible with polyvinyl acetate; P1, P2 and P4 with Parlon, chlorinated rubber. All grades of Hypalon show very limited compatibility with natural resins, except rosin, cellulose ethers and esters other than the nitrate, isomerized rubber, and various types of alkyd resins. No information is given regarding compatibility of Hypalon resins with each other.

While the acrylics discussed above are of interest for special applications requiring heat, light and chemical stability, and inherent flexibility, it should be pointed out that their price, on a pound basis, is considerably higher than that of most vinyl polymers and copolymers.

Vinyl ethers: Grades of commercially available vinyl ether monomers include the methyl through ethylhexyl ethers, as well as some chlorinated ethers; these are stated to be easily polymerizable with mineral acid, $ZnCl_2$ or BF_3 catalyst, but not with peroxide-type catalysts. The higher molecular weight polymers are said to have been used in Europe as pressure-sensitive adhesive, the lower molecular weight polymers as plasticizers and modifiers for nitrocellulose, ethyl cellulose, polystyrene and synthetic elastomers.

Allyl Resins—These are polymers of the esters of allyl alcohol, $H_2C{=}CH{-}CH_2OH$, which can be made from propylene by high-temperature chlorination followed by hydrolysis. The alcohol is esterified, usually with polybasic acids, thus producing esters containing 2 or more allyl radicals per molecule. Because of the resulting polyfunctionality, a three-dimensional network is formed upon polymerization using peroxide catalyst. This results in rapid gelation as polymerization proceeds. Fully polymerized allyl resins are practically insoluble and infusible; a partially polymerized mixture which is soluble in various solvents, may be useful for coating in solution form.

The main characteristics of these resins, aside from insolubility and infusibility, are abrasion resistance, hardness, strength, and good color. They are used for bonding, lamination, impregnation, and are stated to have a definite future in the field of very resistant coatings.

High-Polarity Polymers

Polyvinyl acetate—These resins are non-toxic, odorless, and slow-burning. Solutions produce coatings of high gloss and transparency, showing good adhesion to most surfaces including metals. Extreme heat and light stability are claimed. Films resist salt solutions and weak acids and alkalies. Their main limitations are the tendency to soften on heating, and swelling in water. These drawbacks are more pronounced in the lower molecular weight polymers.

Polyvinyl acetate is soluble in ketones, esters, chlorinated hydrocarbons, nitroparaffins, lower-boiling aromatics, and in lower-boiling alcohols containing a small quantity of water (methanol even when used in the anhydrous form). Complete compatibility with nitrocellulose is claimed, as well as with some phenolics and chlorinated rubber. Various gums and alkyds are stated to give useful combinations with polyvinyl acetate despite partial incompatibility. It is compatible with most of the common plasticizers. Castor and linseed oils show sweating-out. Lower polymers become tacky at a lower plasticizers content than higher molecular weight polymers, and the former show less flexibility and lower softening point.

Uses of polyvinyl acetate, besides wet-laminating adhesives and heat-sealing coatings, include leather coatings, for which the use of higher molecular weight resins is advocated with oil-immiscible plasticizers to prevent embrittlement by absorption of plasticizer into the leather; metallic inks, in which high leafing power and non-tarnishing is claimed for polyvinyl acetate; and paper coatings such as high-gloss over-lacquers

for decorative and protective purposes, in which appreciable raising of the softening point is claimed to be accomplished by the inclusion of 10 to 25% nitrocellulose or cellulose acetopropionate. For hot-melt compositions, low-molecular polyvinyl acetate is used together with plasticizers and/or low-melting resins or gums. These show less strength than films applied from solution. Lacquer-phase emulsions employing polyvinyl acetate and various emulsifying agents are recommended for limited penetration over porous surfaces, reduced fire hazard and higher solids content without cobwebbing tendencies.

Modified resins marketed in solution form contain some OH groups obtained by partial hydrolysis of the polyvinyl acetate (24 to 28% calculated as vinyl alcohol). They are tough and flexible without plasticizer, and show increased shock resistance and adhesion to metals and phenolics compared to the regular resin grades. They are used in adhesives and paper coatings showing good oil resistance. Their main drawback is increased water sensitivity compared to unhydrolyzed resin of similar molecular weight.

Dispersions, products of emulsion polymerization, are available in several molecular weight grades, the higher being only partially solvent-soluble. DuPont's dispersions produce water-sensitive films, the water resistance of which can be improved to some extent by addition of glyoxal, dimethylolurea, various chromic compounds, or solvents (preferably water-immiscible). They can be compounded with dyes and pigments, tackifiers such as rosin, block reducing substances (e.g. colloidal silica, dimethylolurea) and thickening agents (e.g. sodium carboxymethylcellulose or polyvinyl alcohol). Bakelite Corp. dispersion, containing a heat-convertible emulsifying agent, is made water resistant by a moderate amount of heating, but requires very high heat to produce film clarity.

Polyvinyl Butyral—These resins, produced from polyvinyl acetate by hydrolysis and reaction with butyraldehyde, possess such low molecular symmetry (due to residues from intermediate products) that exceptional toughness at low temperature is achieved. The presence of polar groups produces excellent adhesion to glass (e.g. safety glass lamination).

Coating Applications—Commercial alcohols (not anhydrous grades) are solvents for these resins, and large amounts of ketones, esters, and aromatic hydrocarbons are tolerated. These diluents decrease the viscosity at given solids content compared to straight alcohol solutions, ketones being most efficient in this respect. Minimum viscosity occurs at 60 to 80% diluent in the thinner.

Bakelite resin of 18% vinyl alcohol content (equivalent 7% OH content) is produced in 2 viscosity grades. They are known as the Vinylite X series. Monsanto and other companies produce a similar product. These resins are used for tough, flexible, cloth and paper coatings and leather finishes. For increased adhesion and toughness in metal lacquers and for bonding adhesives in conjunction with phenolics or natural resins, this particular class of resins are recommended. The excellent adhesion of butyral resins to wood is utilized in a 50–50 mixture with shellac, which sands and polishes well. It may also be used in primers and knot sealers.

In phenolic metal coatings, ½–1% polyvinyl butyral eliminates cratering tendencies.

According to Monsanto's literature polyvinyl butyral is compatible with nondrying alkyds, rosin esters, nitrocellulose (R. S.), and alcohol-soluble phenolics. Bakelite Corp., besides the above, mentions the possibility of improving solvent and water resistance by reacting polyvinyl butyral with drying oils or vulcanizing agents. Generally, polyvinyl butyral coatings are stated to have good resistance to alkali, water, and sunlight, poor resistance to acids, alcohols, esters, chlorinated hydrocarbons and aromatics.

Wash Primers—One of the most important applications of polyvinyl butyral for surface coatings is in the production of highly adherent metal surface primers. For this application, Monsanto produces a grade of lower polyvinyl alcohol content than those discussed in the previous section (11½ to 12½%). This is compounded with zinc chromate and phosphoric acid. Bakelite Corporation's formulae use their 18% polyvinyl alcohol content product in a similar formulation. This type of primer becomes insoluble on air-drying, and adheres strongly to steel, stainless steel, galvanized, copper, nickel, anodized aluminum, and magnesium. A 0.3 mil coating has shown considerable improvement in performance of oleoresinous and alkyd base vehicles applied over it, and also prevents creepage of corrosion under exposed edges of the paint film. The above type of formula, using zinc chromate, must be applied within 8 hours after the phosphoric acid had been added, necessitating a two-package primer. Substitution of lead chromate as the pigment makes possible the formulation of a one-package primer stable for at least 1 year; however, this will adhere only to steel. Use of chromic oxide produces a one-package primer (stable for 6 months) adhering to all kinds of metal, but this necessitates special mixing procedures because of the hazard involved.

If vinyl resins are to be applied over this type of primer coat, a second coat of Vinylite VAGH is necessary in order to secure adhesion between primer and top coat. An all vinyl finishing system has been established on this basis.

Water Dispersions—Dispersions of 50% solids content are available, which can be sprayed at 35% solids. Excellent stability is claimed, even on boiling. They can be compounded with pigments and plasticizers previously water-dispersed and emulsified, respectively. They are compatible with other latices of similar pH (9–10) and particle charge. Dispersions coagulate at a pH of about 8.5. Only sufficient heat for drying is required to form a film of full strength.

Water-Soluble Polymers

THIS group includes polyvinyl alcohols of varying molecular weight and degree of hydrolysis (the non-hydrolyzed groups up to 50%, being acetate groups) and the alkali and ammonium salts of polyacrylic acid and of Vinylite SYHM, an equimolar copolymer of styrene and maleic anhydride. These are used to some extent in sizings. Their main use in surface coatings is as thickeners in emulsion latex coatings, to adjust the viscosity and stabilize the dispersion.

Good place to come

FOR HELP IN STRETCHING YOUR WHITE PIGMENT SUPPLY

Useful technical help in your battle to match your white pigment inventory to your customers' varying demands is yours for the asking.

The Technical Service Department of Titanox is armed with a wealth of practical data and experience that can save you valuable time in applying the versatility of Titanox Pigments to ease your problems today.

Consider the rutile Titanox Pigments, for example. Although each of these pigments has been developed through research to impart special properties exceedingly well, all are well fitted for a wide range of other applications. In fact, with just four rutile—RCHT, RANC, RA, RC—pigments you can meet the bulk of your customers' requirements.

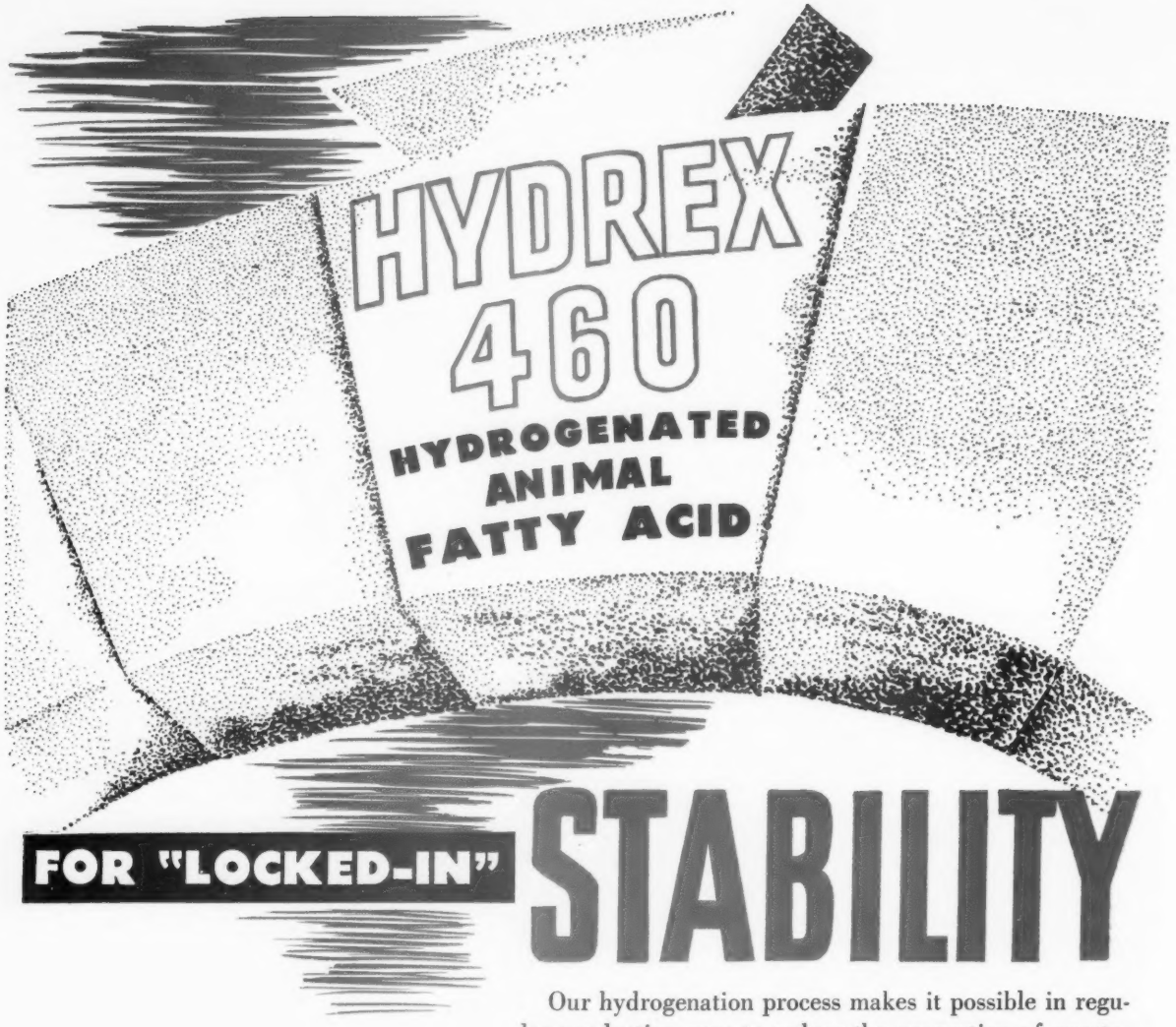
Call or write the Technical Service Department today. You can be sure of their willing cooperation to help you get the most benefit from your Titanox Pigments. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments, Ltd., Montreal 2; Toronto 1.

® TITANOX

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY



FOR "LOCKED-IN" STABILITY

Our hydrogenation process makes it possible in regular production runs to reduce the proportion of unsaturated compounds to a minimum . . . greatly improving the stability of the fatty acid *and the end product.*

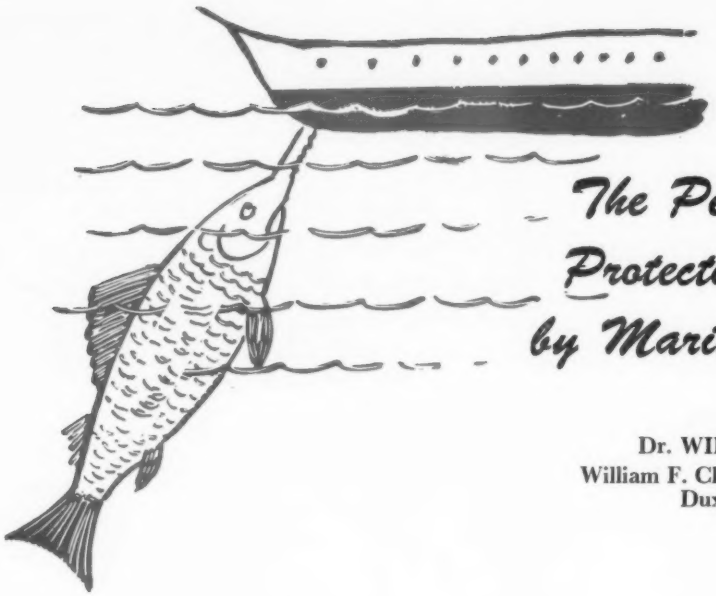
For example, Hydrex 460 Hydrogenated Animal Fatty Acid is a water-white, stable, saturated fatty acid that is relatively rich in stearic acid (about 70.0%), with about 30% palmitic acid and practically free of oleic acid. Yes, with our hydrogenation technique, we are producing high melting point, low iodine value fatty acids with controlled composition. Manufacturers of fatty acid esters, metallic stearates, special lubricants and other products where *stability* is essential, should investigate medium-priced Hydrex 460 Hydrogenated Animal Fatty Acid.

HYDREX 460 SPECIFICATIONS

Titre	(134.6-140.0° F) 57.0-60.0° C
Color 5¼" Lovibond Column (max)	4 Yellow-0.4 Red
Iodine Value (Wijs)	1-4
Free Fatty Acid (as oleic)	100-103%
Acid Number	199-205
Saponification Value	201-207

W. C. HARDESTY CO., INC.
41 EAST 42nd STREET, NEW YORK 17, N. Y.
HARDESTY PRODUCTS ARE INDUSTRY'S KEYSTONE
ESTABLISHED 1926

FACTORIES: DOVER, OHIO TORONTO, CAN.



The Penetration of Protective Coatings by Marine Organisms

By
Dr. WILLIAM CLAPP
William F. Clapp Laboratories, Inc.
Duxbury, Mass.

THE marine organisms which are known to penetrate, or to damage, protective coatings may be divided into two groups.

The first group would include those organisms which drill into, or through, such coatings for food or for protection, and the second group, those which push more or less deeply into some of the materials upon which they grow in an effort to obtain a more secure foothold.

The Crustacean, Limnoria, belongs in the first group. Limnoria lignorum is capable of drilling into the hardest woods. In such timbers as Southern Yellow Pine and Douglas Fir, the destruction caused by this species may proceed at the rate of one inch in depth per year. It has been found frequently drilling more or less shallow burrows in timbers which had been heavily treated with coal tar preservatives, and also into asphalt coatings. The rate of destruction is dependent upon the consistency of the material into which this organism attempts to drill. The harder woods are many times more resistant to attack. On the other hand, materials such as coal tar saturated felt appear to be immune to Limnoria attack.

Since attack by Limnoria is frequently found in coal tar saturated wood and not in a protective coating of coal tar saturated felt, it would seem that the toxicity of the coal tar is not the governing factor, but rather that the consistency of the felt is such that the Limnoria have difficulty in penetrating this and similar materials.

For this reason, such coatings are widely used to protect timbers, more particularly where repairs or replacements are difficult and costly.

Some of the Molluscan borers also belong in the first group of marine organisms which may damage protective coatings. Of these, the Teredinidae or shipworms are by far the most widely spread and destructive. In some locations, the Pholads or Rock Borers are equally destructive, but they are not as widely distributed as the Teredinidae.

In the case of the Teredinidae and Pholads, all attack is initiated by the minute embryos, rarely more than 1/50″ in size. A protective coating which may provide perfect protection against attack by these organisms will be completely worthless if covered with a thin layer of unprotected wood. The embryos will enter this veneer and rapidly grow to a size which can easily penetrate the protective coating beneath.

However, protective under coats of such materials as coal tarred felt, sheet copper or other materials provide a mechanical barrier through which none of the Crustacean or Molluscan borers can penetrate.

With many protective coatings a very minute abraded or checked area will permit the entrance of the borers. It is, therefore, considered good practice to provide a borer resistant priming coat beneath an antifouling protective coating.

The above comments refer very briefly to those organisms which may damage protective coatings on wood.

Barnacles

THE second group of marine organisms which may damage protective coatings include several species belonging to a single family of encrusting organisms commonly known as barnacles. There are several forms of marine life which in order to survive must become firmly attached to a suitable base. Many accomplish this by forming a lime base firmly cemented to the materials upon which they grow. Such organisms include the various species of the oyster, the calcareous worm tubes, mollusks such as Anomia and some of the Bryozoa. All must become attached to some base early in life when they are very minute. As they grow, the lime base is enlarged. If the material upon which the attempt to grow is of such a nature that the organisms are unable to build and maintain a firm foothold,

This paper was presented at the Third Symposium of Paint and Varnish Chemistry sponsored by the College of Engineering of New York University held on Nov. 18, 1950.

the organisms fall off. Since they are not capable of forming a new attachment, such individuals die.

Of all the organisms which form such firmly adherent lime bases, only those species of barnacles which construct a complete heavy calcareous base are capable of penetrating and damaging protective coatings. As these organisms enlarge from the embryonic stage, the side plates which cover and protect the animal within, are pushed outward to accommodate the additional growth. At the same time, a downward pressure is exerted with the result that the base and the side plates are pushed downward in any material which is not sufficiently hard to resist the force exerted. Species of barnacles, such as Balanus balanoides which do not form a lime base are incapable of seriously affecting the materials upon which they attempt to grow. Balanus eburneus and many allied species form heavy calcareous bases. The pressure exerted by these organisms is sufficiently great to enable them to become embedded to a depth of 15 millimeters or until only the top of the shell remains exposed. Such penetration is commonly found in such protective coatings as coal tar enamel and asphalt.

When asphalt or coal tar or similar coatings are used over metal in salt water, these organisms may penetrate to the metal through one quarter of an inch of the coating in two or three months.

Upon the death of the animal, decomposition soon follows and water, together with the decomposition products, is then in contact with the unprotected metal. With some metals and alloys corrosion and pitting may result.

Some protective coatings have been developed which are sufficiently hard to resist mechanically serious penetration by the barnacles. In some protective coatings, metal foil of sufficient thickness to prevent penetration has been used successfully. An undercoat of coal tar saturated felt will also prevent serious penetration by the barnacles. At the present time, for protective coatings in salt water which cannot be readily or freqeuntly renewed, some form of such mechanical protection is generally depended upon rather than on the toxicity of antifouling coatings.

Figure 1. Balanus embedded deeply in a bituminous coating.

Figure 2. Balanus embedded in wax.

Figure 3. Balanus in bituminous type coating shows complete penetration to metal beneath.

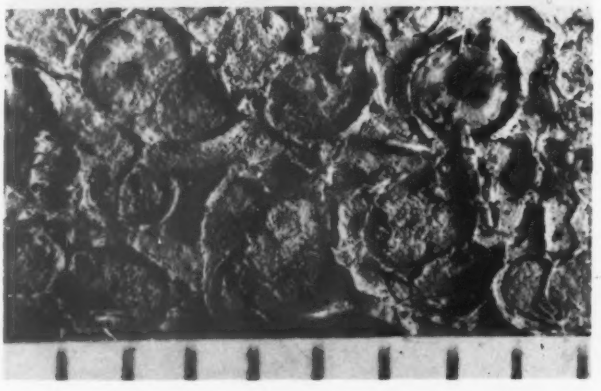


Figure 4. Beginning of penetration in a paint coat by juvenile Balanus. Divisions indicate 1 mm.

THE EVALUATION OF VINYL COATINGS FOR SURFACES SUBJECT TO FRESH WATER IMMERSION

By

J. L. ROHWEDDER F. W. SHANKS

Rock Island District Corps of Engineers

THE EVALUATION of a new type of coating—new at least to the user, is a time consuming, tedious operation. If the using agency already has protective coating systems which are giving satisfactory service, those charged with evaluation and keeping abreast of new developments are especially reluctant to supplant them without conclusive evidence of superiority.

Such is the situation which confronts the Rock Island District in evaluating protective coatings for those structural steel components of Civil Works Structures of the Corps of Engineers which are subject to intermittent and continuous immersion in inland waters. Several phenolic systems have been in use for a good many years in this type of exposure and their satisfactory durability has the practical effect of discouraging the adoption of new coatings until they are thoroughly proven. The tendency to permit more caution in this matter to turn into complacent disregard of new methods and materials is rather serious, and for this reason the Office, Chief of Engineers has authorized the Rock Island District to carry on a limited investigation of protective coatings with the principal objective of effecting more economical maintenance of structural steel surfaces.

This paper was presented at the Third Symposium of Paint and Varnish Chemistry sponsored by the College of Engineering of New York University held on Nov. 18, 1950.

Methods of Evaluation

IN the evaluation of coatings for immersed steel surfaces the assumption is made, based on considerable testing experience, that test results will probably lead to erroneous and misleading conclusions unless the test environment duplicates, as nearly as possible, anticipated exposure conditions. Durability in atmospheric exposure cannot be considered as reliable evidence of suitability for submerged steel surfaces. Good performance in quiet nonabrasive waters cannot be considered as conclusive evidence that a coating will be satisfactory under the variety of abrasive conditions which may be encountered. Moreover, suitability of a coating system under one set of immersion conditions does not indicate with certainty that the system will be equally durable when such influencing factors as water temperature, soluble constituents, quantity of suspended sediment and floating debris, and proportionate time in and out of water are varied. Therefore, new types of coatings are generally evaluated in the following sequence to determine their usefulness for submerged exposure conditions:

a. Technical data and the makeup of the systems are first evaluated on paper in the light of past experience.

b. Coating systems considered to be of promise for fresh water immersion are applied in duplicate or triplicate for each test environment on small scale laboratory panels and tested by continuous immersion in Mississippi River water maintained at 85 to 90 degrees F., Mississippi River water at its natural temperature, and in rural atmospheric exposure. Additionally, wet abrasion tests on a laboratory scale are conducted to determine the resistance to wear of the coatings in moving water carrying suspended matter and floating debris.

c. Those systems showing initial promise in the small scale panel tests are then applied in the field to the surfaces of submergible steel components of hydraulic structures in the Mississippi River. The field tests vary in area from five hundred to several thousand square feet and test surfaces are selected so that each coating being evaluated is subjected to the following exposure conditions: continuous atmospheric exposure, intermittent immersion in fresh water, and continuous immersion. Those areas subject to immersion are also exposed to varying degrees of erosion and abrasion from flowing water carrying considerable quantities of floating debris and suspended material.

d. The most promising systems in the field tests are selected

Ice in eddy above Tainer Gate of Mississippi River Dam No. 21.

for maintenance application on a limited but expanding scale. Information concerning these most promising coatings is circulated to other organizations within the Corps of Engineers for trial under immersion conditions which, though similar to those of the original test work, provide a greater range of exposure variables. Eventually those systems which have proven most satisfactory are recommended for use throughout the Corps for application to submerged steel surfaces of Civil Works Construction. However, a precautionary note is interjected to the effect that new users should proceed with initial caution in the employment of the recommended systems until it is reasonably sure that they are suitable for the specific service conditions encountered. Thus no presumption is made that any particular coating system, found to be most satisfactory on submerged steel surfaces in the upper Mississippi River, will perform equally well under all conditions of submerged exposure in inland waters. Rather it is hoped to be able to prescribe several durable systems which will provide at least a well advanced starting place in the selection of the most suitable coating for a particular exposure condition.

It is obvious that if the period from initial consideration of a new coating to its adoption as a standard maintenance paint is to be at all reasonable the sequential testing steps as outlined must overlap to some degree. Where a highly durable coating is under test, the more advanced phase of its evaluations, namely, field testing, may be initiated long before the small scale panel tests are completed. The need for highly accelerated test procedures capable of being correlated with actual field results is very great but so far are not forthcoming. It is, in general, possible to separate the very good systems from the very poor ones by means of accelerated tests but the differentiation of lesser variations in durability is possible only by placing the test systems in exposure conditions approaching those of actual service. Among the more recent coating developments of the paint industry which have gone through the evaluation procedure just outlined are the coatings based on vinyl resins.

Vinyl Systems

ALTHOUGH a detailed discussion of the various resins which are the film forming basis of the vinyl type coatings is not in order here, it is considered advisable to touch briefly on this subject. As far as protective coating work is concerned, the vinyl resins may be divided into two major types; i.e., polyvinyl butyrals and vinyl chloride-acetate copolymers. With respect to field applied protective coatings, the vinyl butyral resins are now used chiefly in the preparation of the so called wash primers which are sprayable combinations of vinyl butyral resin, chromate pigments, and phosphoric acid. The wash primers were formulated to condition metal surfaces prior to receiving subsequent paint coats, provide an adhesive bond for subsequent coats, and provide some degree of anti-corrosive protection. For coats subsequent to the wash primer, the vinyl butyral type of coating has been largely supplanted by lacquers based on copolymer resins, since they provide considerably fewer application difficulties. The copolymer coatings resins are modified in several ways during manufacture and may be divided for purposes of this brief discussion into the following groups; (a) straight chloride-acetate copolymers, (b) copolymers modified by addition of an unsaturated dibasic acid during the polymerization, (c) chloride-acetate copolymer in which a portion of the acetate groups in the resin molecule is replaced by a hydroxyl group. For practical purposes, the various types enumerated above may be further characterized as follows: (a) The straight chloride-

acetate copolymer type of coating, when used as an air drying material, will not adhere effectively to bare steel surfaces or to wash primer-treated surfaces but will adhere to itself or other copolymer films, (b) air dried coatings based on the carboxyl containing copolymer resin will adhere well to bare steel surfaces, to themselves and to other copolymer films but will not adhere strongly to a wash-primed surface, (c) air dried coatings based on the hydroxyl containing copolymer resin will adhere strongly to wash primed surfaces, to themselves, and to other copolymer films but will not adhere strongly to bare metal surfaces. The above general principles must be kept in mind when using vinyl copolymer systems, if difficulties in establishing and maintaining adhesion at the metal-coating interface are to be avoided.

Evaluation of Vinyls

THE evaluation of vinyl coatings for surfaces subject to immersion in the Mississippi River dates back seven years when three chloride acetate copolymer systems, after brief preliminary consideration, were applied to sections of a tainter gate for comparison with phenolic systems of known durability. These vinyl systems were applied to sandblasted surfaces and all employed primers made up with the carboxyl-containing vinyl resin to obtain air-drying adhesion to metal since the wash primer method of obtaining adhesion had not yet been fully developed. They were spray applied as three coat systems but, due to the unfamiliarity of the personnel with the low solids formulations, the total thickness of the applied films was only about 2.0 mils. In spite of their thinness, these systems compare not too unfavorably with the adjacent phenolic systems. Various areas of the gate are subject to: (1) atmospheric exposure, (2) waterline exposure with attendant intermittent immersion and abrasion, and (3) continuous immersion. The most noticeable difference between the vinyls and phenolics after seven years exposure was at the waterline areas where the thin character of the vinyl coatings permitted them to be abraded away to metal more rapidly than the phenolics. It should be pointed out also, that the phenolic systems were put into a more favorable position to withstand abrasion in that they were "reinforced" with silica sand particles embedded in the second of the 4-coat systems. This procedure is known to materially increase the abrasion resistance of coatings. The vinyl coatings were not sand reinforced because their rapid drying characteristics make such a practice unfeasible. In summary, it may be said that after seven years exposure in an underwater, abrasive environment the vinyl coatings are still offering protection to a sufficient degree that repainting is not yet considered necessary.

Other Studies

PROMISING results experienced in these original field tests after the first 4 years of exposure prompted a much more detailed and comprehensive test program for vinyl type coatings. Vinyl systems employing the wash primers to obtain air drying adhesion have particularly been given much attention. The use of the wash primers as a method of pre-treatment for phenolic and other conventional systems has likewise been evaluated both on small scale panels and in the field. Several hundred small scale panels have been placed in immersion tests to determine, among others, such factors as:

1. The effect of different pigment types on durability.
2. The effect of varying the pigment volume concentration.
3. The effect of varying types and proportion of plasticizers.
4. Application characteristics with respect to solvent formulation.
5. Feasibility of reinforcing vinyl systems with embedded sand.
6. Effect of the length of drying time prior to immersion on durability.
7. Effect of surface preparation variables on durability characteristics.
8. Effect of temperature of immersion water on performance characteristics.

Looking southeast from river wall of lock. Mississippi River Dam No. 20.

Drift in eddy above Tainer Gate No. 1 of Mississippi River Dam No. 21.

9. Durability of blends of vinyl and phenolic materials.

10. Relative durability of vinyl systems employing wash primers to obtain air drying adhesion and those which obtain adhesion by means of a carboxyl-containing vinyl primer.

11. Comparative effectiveness of several wash primer formulations.

12. Effect on performance characteristics of varying the film thickness of vinyl systems.

Results

ALL of the above factors are in the process of being investigated on laboratory panels, and a considerable number of them are being investigated in the field on a relatively large scale. Although the majority of these tests, both panel and field, are still being run and will continue for an extended period of time, the following tentative conclusions are advanced. All conclusions are based on systems applied to sandblasted steel and subjected to immersion in fresh water.

1. Vinyl copolymer systems of the type not requiring a wash primer for the obtainment of air dried adhesion to steel will give adequate protection in fresh water under conditions involving quiet water or moderate abrasion and erosion for periods of at least seven years.

2. To date, the panel and field tests indicate no significant difference in underwater durability of the two basic copolymer systems, i.e., the systems employing wash primer and those employing the carboxyl containing resin to obtain adequate air dry adhesion.

3. After full hardness of film has been reached, the vinyl copolymer coatings appear to have better erosion and abrasion resistance than phenolic coatings, unless the latter are "sand reinforced" as described previously.

4. Vinyl copolymer coatings made up with the commonly used solvents and thinners dry to a firm, tack free film with great rapidity; within 15 minutes in good drying weather. One to two hours drying is usually sufficient to permit recoating. Painted components can be re-submerged in quiet water after 24 to 48 hours of final drying without deleterious effects on the characteristics of the film. It should not be inferred, however, that the vinyl coatings reach their full hardness in such a short time. In view of their initial rapid dry, vinyl films remain unexpectedly soft for an extended period of time. This protracted softness is evidently due to entrapment of residual solvent in the film and is particularly noticeable with aluminum pigmented vinyl formulations. When newly painted components are to be submerged in rapidly moving, debris-laden water, it is important that the completed vinyl system be allowed as long a final drying time as practicable, if excessive damage from abrasion is to be avoided.

5. Moderate changes in the plasticizer content of vinyl copolymer formulations seems to have but slight effect on blistering and other aspects of durability in fresh water exposure. Tricresyl phosphate is the only plasticizer which has been studied in detail.

6. Blends containing phenolic varnish solids and the hydroxyl containing vinyl resin show considerable promise for fresh water exposure.

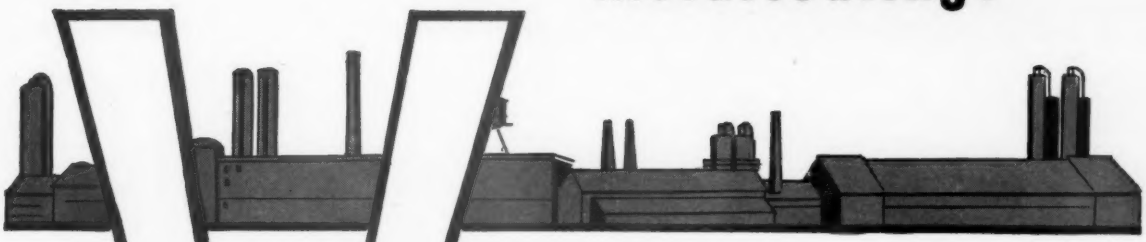
7. As a very general statement, it appears that the type of pigment employed in vinyl coatings has less effect on underwater durability than with other coatings, if one excepts certain pigments which are inherently unsuitable because of reasons of incompatibility.

8. In general also, it appears from work to date that the vinyl coatings tend to blister in continuous fresh water immersion to a lesser degree, both in concentration and size of blisters than phenolic type coatings.

9. Intercoat adhesion, a troublesome factor generally in submerged exposure with conventional oxidizing and polymerizing type coatings is not a problem with vinyl copolymer coatings. Deposited vinyl films remain permanently soluble in the solvents which were used in making up the

(*Turn to page 34*)

what's NEW in Metalcoating?



VELSICOL

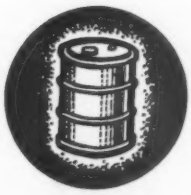
RESIN

AD-4

. . . affords significant new advantages in substrate protection over iron, tinplate, steel and terne plate, plus chemical resistance for packaging containers. Your products and processes may benefit materially through having the facts. Write for Velsicol Bulletin No. 221.

for...

DRUM COATINGS



PROTECTIVE LINERS

PRIMERS

VELSICOL CORPORATION

General Offices and Laboratories
330 E. Grand Avenue
Chicago 11, Illinois

"VELSICOL"

Export Division
100 E. 42nd Street
New York,
New York

representatives in principal cities

P&V NEW PRODUCTS & IMPROVEMENTS

A MONTHLY MARKET SURVEY

L. O. KOVEN

MIXER
Gas-Heated

Mixer is used in mixing processes requiring accurate heat control. Used in the manufacture of chemicals, dyes, paints, plastics, etc. The inner mixing tank is 36 inches in diameter and 36 inches high with a dished bottom. Agitator is constructed of stainless steel. Discharge is made through the bottom of tank and is controlled by means of a horizontal long stem valve whose handle extends beyond the outer shell. L. O. Koven & Brother, Inc., 154 Ogden Ave., Jersey City 7, N. J. PVP—July.

RESIN DISPERSION
Non Solvent Type

Non solvent type, high melting resin dispersion, "Dresinol 155," is used as a modifier and extender for rubber latices in adhesives, supported films, and binders of all types. According to the manufacturer, this dispersion is compatible with all types of latices. Hercules Powder Co., Wilmington, Del. PVP—July.

MAGNIFIER
Has Built-in Light

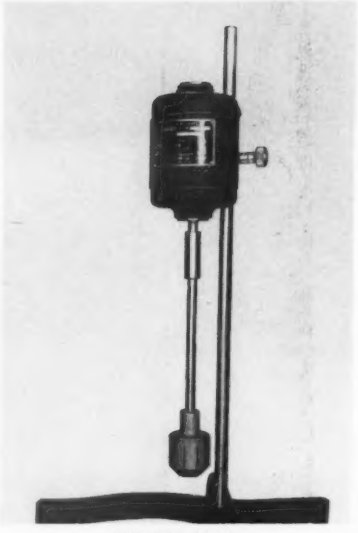
Instrument combines a 7 power magnifying glass with a powerful light, built into handle. It clearly illuminates the magnified field of vision, without throwing direct rays into user's eyes. Known as Flash-O-Lens, this magnifier is available from Abbeon Supply Co., 58–10 41st Drive, Woodside, N. Y. PVP—July.

GRINDING MEDIA
Natural Shape

Natural shape grinding media is said to increase as much as 40% the dispersion rate of paint pigments in pebble mills according to the manufacturer. The idea of "natural shape" media was taken from the shape of pebbles after they have been used in a mill for some time. It is said that the flatter angle permits faster dispersion because it provides a combination of rubbing action and impact over a greater surface contact area. Thus, more of the pigment-vehicle mixture is caught between the grinding surfaces.

The media is made of special high-density alumina ceramic material. The material is pure white, thus preventing any color contamination. High density of the ceramic material gives 38% more weight per volume which means faster dispersion. This grinding media was developed by the Coors Porcelain Co. and is being marketed by Landes, Zachary and Peterson, 272 South Santa Fe Drive, Denver, Colorado. PVP—July.

LANDES, ZACHARY & PETERSON



PREMIER MILL

MIXING DEVICE
For Emulsification

Mixing device is used where propellers are generally ineffective. According to the manufacturer, this device can be used for speedy emulsification, dispersion and intimate mixing.

Operations tested are: building up of emulsions and dispersions, acceleration of chemical reactions, prevention of settling out, speed-up in the preparation of solutions. Known as the Premier Dispersator, this device is available from the Premier Mill Corp., Geneva, N. Y. PVP—July.

CONTENT NOMOGRAPH
For 55-Gallon Drums

Nomograph permits rapid and accurate determination of the gallons content of 55-gallon shipping containers. The chart is fabricated from 18 gage aluminum. Each chart is furnished with a special clear plastic strip, which carries an accurately machined hairline, Henry A. Gardner Laboratory, Inc. 4723 Elm St., Bethesda, Md. PVP—July.

NEW PRODUCTS

CLEANING MACHINES
For Steel Drums

Two Rotoblast drum cleaning machines,, Models ES-400 and ES-382, simplify and speed the removal of dirt, rust, paint and other foreign materials from 30 and 55 gal. returnable steel drums and lids before reuse.

Metal abrasive, hurled against both the interior and exterior surfaces of the drum by centrifugal force, scours the metal, leaving no chemicals or alkalies to wash off, and providing a clean bonding surface for repainting. Drums are automatically handled during the cleaning operation—only one man is required to load and unload the barrels. For further details write to the Pangborn Corp., Hagerstown, Md. PVP—July.

IMPROVED TALL OIL
Light Color

Ardex PE is the trade name for an improved tall oil. Compared with Smithco PE, the company's old tall oil, it offers lighter color, improved film properties, and greater uniformity.

Ardex PE is esterified with pentaerythritol for a fast, hard dry and higher chemical resistance. It is recommended for use as a checking oil in varnishes and as a modifier in flat, semi-gloss and full gloss systems, in barn paints and as a wood preservative.

Color of Ardex PE ranges from 10 to 12 (Gardner). Acid number is 10–20, viscosity (G–H), Z_5–Z_6 and weight per gallon, 8.3 lbs. For prices and samples, write, Archer-Daniels-Midland Company, Box 839, Minneapolis 2, Minnesota. PVP—July.

LET DOWN MACHINE
Automatic

A machine capable of simultaneously coating any number of colors on a sheet of paper has recently been developed. The process permits the application of colors, regardless of tone, range or hue, next to one another without the possibility of overlapping or over-running. Color stripes may be of any width and inter-mixed so that thin stripes may be placed next to broad stripes, if desired. The machine works with different finishes of paint—gloss, flat or semi-gloss.

The process offers interesting possibilities to manufacturers of paints, lacquers, varnishes, pigments and to firms who produce materials in broad color ranges. Tobey Color Card Co., 1522 Olive St., St. Louis, Mo. PVP—July.

FLOOR MACHINE
Explosion-Proof

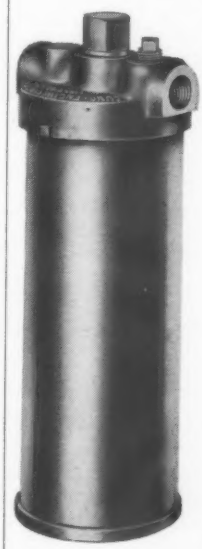
A new explosion-proof all purpose floor machine called the Holt Explosion-Proof Commander, is designed to safely maintain floors in powder factories, oil refineries—wherever positive safety steps are required.

This unit does a fast, economical job of sanding, waxing, polishing, scrubbing, wire-brushing, steel-wooling, and grinding floors.

This rugged new machine is vapor proof, spark proof, and shock proof. It is custom-built under safety regulations. All wiring, all electrical apparatus is safety-tested and sealed. All electrical fittings and connections bear the Underwriters Approved Seal of Safety. Holt Manufacturing Co., 651 20th St., Oakland 12, California or 272 Badger Ave., Newark 8, N. J. PVP—July.

Why do nearly all leading manufacturers* use Cuno MICRO-KLEAN Filters?

*of high-grade enamels and other pigmented products



- **SMOOTH FINISH GUARANTEED** Cuno MICRO-KLEAN guarantees the removal, mechanically, of *all* oversize pigments and contaminants.
- **FITS THE GRIND** A variety of controlled cartridge densities gives the right degree of filtration to suit each grind.
- **DOUBLE CAPACITY** Exclusive "graded density in depth" prevents premature plugging, assures uninterrupted running of each batch.
- **EASY CLEANING** Compact housing is easily disassembled and cleaned out at cartridge-replacement time.
- **LESS FILTER COST** Smaller sized Cuno MICRO-KLEAN will handle a batch with fewer cartridges.

FOR PAINTS
Use Cuno AUTO-KLEAN strainer, all-metal, continuously cleanable. Guaranteed to remove all particles larger than specified. Available spacings from .0035 in. up.

Models available for all size batches, including laboratory and odd-lot work. MICRO-KLEAN has also been successful in filtering clear vehicles.

SEND COUPON FOR FREE BULLETIN

CUNO ENGINEERING CORPORATION
194 South Vine Street, Meriden, Conn.
Please send literature on MICRO-KLEAN for..... (mention application)
Name.....Title.....
Address.....
City.....State.....
PLEASE ATTACH COUPON TO YOUR BUSINESS LETTERHEAD

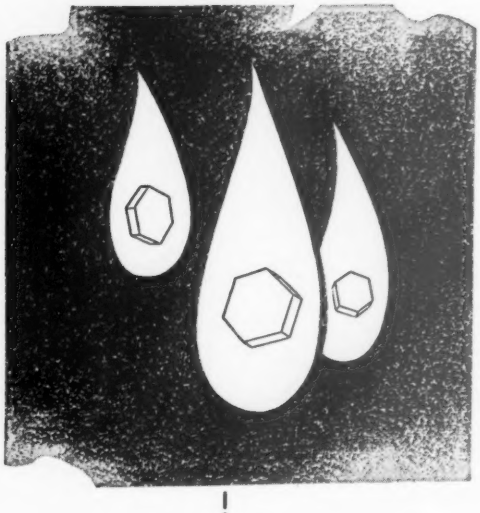
CUNO

THE COMPLETE LINE
Fluid Conditioning
Removes More Sizes of Solids from More Types of Fluids
MICRONIC (Micro-Klean) • DISC-TYPE (Auto-Klean)
WIRE-WOUND (Flo-Klean)

ASP

ALUMINUM SILICATE PIGMENTS

INERT PIGMENTS THAT *IMPROVE* YOUR PRODUCT



HOW EDGAR ASP 100 CUTS DOWN MILL WEAR AND GRINDING TIME

Because of Edgar ASP 100s extremely fine particle size (maximum size 10 times finer than a 325 mesh screen) and inherent softness, mill wear is materially reduced. Coupled with this fact is Edgar ASP 100s unusual ease of dispersion and excellent wettability which can cut grinding time up to 50% at no loss in fineness of grind.

Two solid qualities which this inert pigment gives you in addition to the saving on expensive and scarce pigments. And, as with all Edgar products, craftsmanship in production combines with meticulous quality control to give you an inert pigment of continuously uniform, high quality.

Why not receive all the facts by sending in this coupon . . . technical literature and sample drums are available . . . no obligation, of course.

Please send me the following:

- ⬡ **File folder with up-to-date technical data.**
- ⬡ **Sample drum** ⬡ **2 lb.** ⬡ **5 lb.** ⬡ **10 lb.**

Name_____

Firm_____

Address_____

ASP 100

Edgar

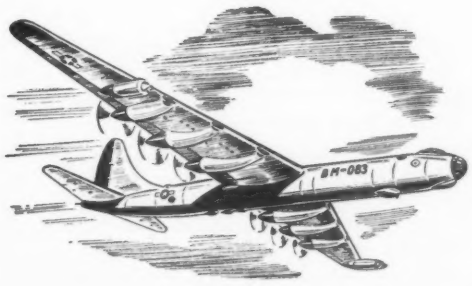
Incorporated 1899

EDGAR BROTHERS COMPANY

METUCHEN, NEW JERSEY

Meet these Rigid Government Paint Specs...*with these U.S.I. resins*

JAN-L-73 LACQUER ENAMEL, LUSTRELESS	
Grades I, II, III	AROPLAZ 945-X-65
(Current revision to hot spray type will also utilize AROPLAZ 945)	
JAN-E-74 ENAMEL, LUSTRELESS, QUICK DRYING (non lifting to lacquer)	
GRADE I, Non-Infrared Reflecting	AROPLAZ 663-X-50
GRADE II, Infrared Reflecting (Olive Drab only)	AROPLAZ 663-X-50
GRADE III, Oil Resisting Non-Infrared Reflecting	AROPLAZ 663-X-50
MIL-P-6889A PRIMER, ZINC CHROMATE	
Types I and II	AROPLAZ 1365-X-60
MIL-E-10687 (Ordnance) ENAMEL, LUSTRELESS, QUICK DRYING	
WHITE; BLACK #301; BLUE #307; RED #314; YELLOW #316; OLIVE DRAB #319; GREEN #322; BLUE GRAY #331	AROPOL 865-P-60 (for grind) AROPOL 880-X-50 (for let down)
MIL-E-15090, ENAMEL, EQUIPMENT Lt. Gray (FORMULA III)	
Type I, Medium air-drying, Class 1 gloss and Class 2 semi-gloss	AROPLAZ 1240-M-70
Type II, Fast air-drying, Class 1 gloss and Class 2 semi-gloss	AROPLAZ 663-X-50
Type III, Baking, Class 1 gloss and Class 2 semi-gloss	AROPLAZ 1136-X-50



New government specifications for finishes used on ammunition, military aircraft, and other defense items require *special resins* with really exacting performance characteristics. You'll find the resins to meet or exceed these new, more rigid specifications in U.S.I.'s "Complete Resin Line"—because U.S.I. is constantly adding new, specialized resins to the line . . . keeping abreast of the latest developments in the protective coatings industry through continual forward-looking research.

There's a local U.S.I. technical representative in your area who has complete information on not only these specifications but also any of the other important government issues as well. Write or phone your nearest U.S.I. office *today!*

U.S.I. INDUSTRIAL CHEMICALS, INC.

60 East 42nd Street, New York 17, N. Y.

Branches in all principal cities

Dr. M. F. Browne

M. F. Browne Joins Plaskon

Dr. M. F. Browne has joined the Research Department of the Plaskon Division, Libbey-Owens-Ford Glass Company. Dr. Browne will participate in research on glues and industrial resins.

•

Naftone Appoints Agents

The Oronite naphthenate paint driers and the tallates and octoates sold by Naftone of 515 Madison Ave., New York 22, N. Y., are available through the following local agents:

The Charles A. Wagner Company, Inc., 813–815 Callowhill Street, Philadelphia, Pennsylvania is handling the Pennsylvania territory.

The T. F. Gehle Company, 603 Fisher Building, Detroit, Michigan has these driers for the state of Michigan.

The John H. Calo Company, Inc., 19 Rector Street, New York, New York is serving the Metropolitan New York and New Jersey area.

Warehouse stocks of the Oronite naphthenate driers are maintained at all these points for prompt shipment and Naftone intends shortly to announce the appointment of additional agents with warehouse stocks at other points in the U. S. A.

•

Calco Makes Metropolitan Area Appointments

Leo J. Sobell has been appointed a representative in the New York Metropolitan area for the American Cyanamid Company, Calco Chemical Division, Pigment Department.

Paul S. Kennedy of Interchemical Corporation Succumbs

Paul S. Kennedy, vice-president of the Finishes Div. of the Interchemical Corp. died on June 6th after a brief illness. He was 62 years of age.

Mr. Kennedy began his business career with Murphy Varnish Co. in 1910 and served continuously with the concern until its absorption by Interchemical five years ago.

Mr. Kennedy served as president of the New York Paint, Varnish and Lacquer Association during 1948–1949. At the time of his death he was a member of the executive committee of the New York association and also served on the advisory board of the National Paint, Varnish and Lacquer Association.

McDougall-Butler Names Kent Industrial Head

McDougall-Butler Co. Inc., of Buffalo, announced the appointment of Stanley O. Kent as industrial sales representative in charge of industrial paint sales in the Niagara Frontier area.

•

E. Byrnes Named Chief Chemist Nat'l Manufacturing Company

Edward R. Byrnes has been named chief chemist of the paint and varnish division of the National Manufacturing Company of Tonawanda, N. Y. Mr. Byrnes was formerly with the finishes division of the Interchemical Corp. in Elizabeth, N. J.

NOW — CONTROL SKINNING BETTER!
THE EXKINS,
the NEW NUODEX ANTI-SKIN AGENTS

You can now control skinning better in your paints, varnishes or enamels with Exkin #1 or Exkin #2, the new Nuodex volatile type anti-skinning agents. A natural development of our laboratory investigations into the close relationship between drying and skinning, the Exkins are to skinning inhibitors what Nuodex is to driers—tops in quality and performance.

Try them. They'll give you maximum effectiveness yet minimum interference with drying plus no problems of yellowing, odor or toxicity.

So whether or not you are now using an anti-skinning agent, you ought to know more about Exkin #1 and Exkin #2. Your Nuodex representative is ready to supply you with complete information on how to determine the best concentration of the proper Exkin for your specific formulas based on our special "Which and How Much" data sheet. Call him *today* for all the facts on how the Exkins can control skinning better for *you!*

*If you're not receiving Ye TOWNE DRIER, just contact your Nuodex Agent. He'll put you on our mailing list.

NUODEX PRODUCTS CO., INC.
ELIZABETH F, N. J. • LONG BEACH 5, CALIF.
NUODEX PRODUCTS OF CANADA LTD., LEASIDE (TORONTO), CANADA.
BRANCH FACTORIES AND LICENSEES IN LONDON, ENGLAND • SYDNEY, AUSTRALIA • AMSTERDAM, HOLLAND • PARIS, FRANCE • MILAN, ITALY

Warren O. Erickson

W. O. Erickson Joins Plaskon

Warren O. Erickson has joined the technical department of the Plaskon Division, Libbey-Owens-Ford Glass Company, where he will participate in research on industrial resins, particularly polyester types, it has been announced by Dr. Maurice H. Bigelow, technical director.

A chemistry graduate of the University of Wisconsin, Mr. Erickson came to Plaskon Division from Peoria, Ill., where he was a research and technical supervisor for Northern Regional Laboratory, U. S. Department of Agriculture.

•

Hardesty Names Fischer

Hardesty & Company, 60 East 42nd Street, New York, has appointed Mr. W. W. Fischer sales manager of the concern. Mr. Fischer has been associated with Mr. W. C. Hardesty for a good many years.

A modern plant, located in Philadelphia, Pennsylvania for production of stearic acid, red oil, glycerine and various fatty acids, has just been completed, and the company is rapidly expanding.

•

1951 Paint Industries Show Prospectus

The prospectus for the Sixteenth Annual Paint Industries' Show to be held at Chalfonte-Haddon Hall, Atlantic City, N. J., on October 31, November 1, 2, and 3, has been released.

The Paint Show, held in conjunction with the Convention of the National Paint, Varnish & Lacquer Association and the Annual Meeting of the Federation of Paint and Varnish Production Clubs, offers material suppliers and equipment manufacturers an outstanding opportunity to exhibit their products to the executive, technical, and production personnel of the paint, varnish, lacquer, and allied industries.

About 100 booths will be available this year—more than ever before—and it is hoped that all those wishing to exhibit may be accommodated. The Paint Show has always been a "sell-out" and from pre-prospectus inquiries, this year will prove no exception.

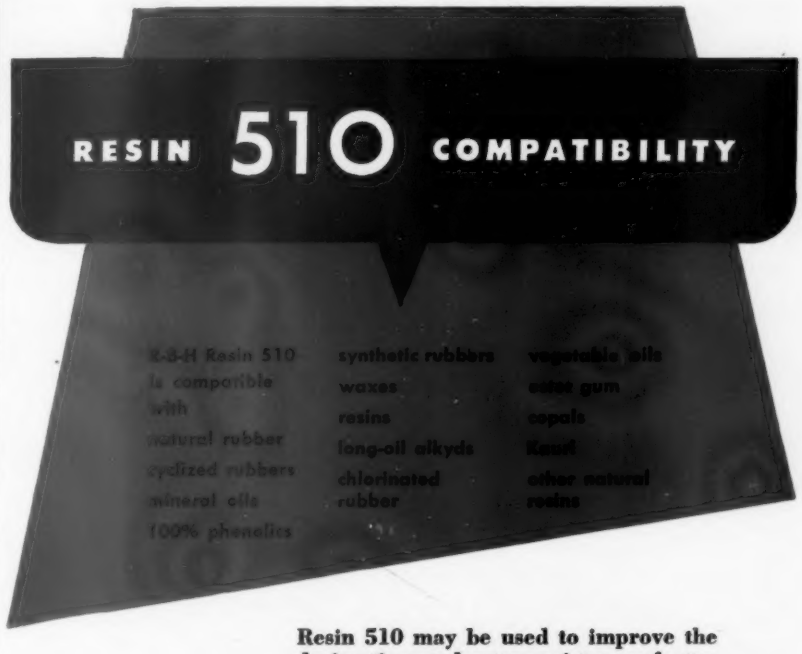
The Paint Industries' Show Committee is composed of Chairman Howard G. Sholl, a member of the Federation Executive Committee from the Baltimore Club; Hiram P. Ball, Federation president-elect from the Pittsburgh Club; Newell P. Beckwith, Federation treasurer from the Detroit Club; and Show Manager C. Homer Flynn, Federation executive secretary.

•

Kimmel Named Technical Advisor For Koppers Chemical Division

Appointment of E. E. Kimmel as Technical Advisor for the Chemical Division of Koppers Company, Inc., was announced by Dan M. Rugg, vice president and general manager of the Chemical Division.

In his new position Mr. Kimmel will be responsible for coordination of all technical matters relating to the development, sale, and use of products presently produced or contemplated for production by Koppers Chemical Division.



Resin 510 may be used to improve the drying time and water resistance of ester gum varnishes. It is outstanding in its performance with phenolic resins, lowering the cost of the varnishes with no apparent sacrifice in alkali- or water-resistance. Write for booklet.

Resin 510 . . . America's Own Fossil Resin

R-B-H *Dispersions*

DIVISION OF INTERCHEMICAL CORPORATION
DISPERSION TECHNICIANS
BOUND BROOK, NEW JERSEY

Pigment dispersions in nitrocellulose; ethyl cellulose; urea formaldehyde, vinyl and alkyd resins; chlorinated rubber and other plastic binders.
R-B-H AND RESIN 510 ARE TRADE MARKS OF INTERCHEMICAL CORPORATION

NEWS DIGEST

E. Scott Pattison

E. S. Pattison Named Manager of Glycerine Div. of Soap Ass'n.

E. Scott Pattison has been named manager of the Glycerine Division, and of the newly organized Fatty Acids Section, according to an announcement made recently by Roy W. Peet, Manager of the Association of American Soap & Glycerine Producers.

Mr. Pattison has resigned as executive vice president of the G. M. Basford Company, New York advertising agency. He has been associated with Basford since 1936, and has been active in the work of the National Industrial Advertisers Association, the Advertising Research Foundation and other industry groups. Previously he was with the Mathieson Chemical Corporation and was assistant editor of Food Industries magazine.

•

L. H. Burt Named Supervisor of Hercules CMC Development

Leland H. Burt has been named supervisor, Product Development, for the Cellulose Products Department of Hercules Powder Company. He has been supervisor of CMC Development for the past two years.

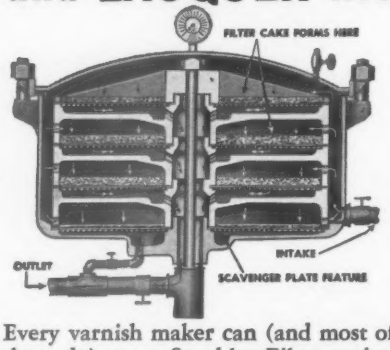
In his new position, Mr. Burt will devote his efforts to various water soluble products, including cellulose gum (CMC), on which he has been specializing during his association with Hercules.

Nuodex Awards Paint Prize To Brooklyn Poly Student

Prof. Henry F. Payne, adjunct professor of Chemical Engineering, under whose direction all courses in oil, resin, paint and pigment technology are given, awards graduate student John McNabb, right, of Cedarhurst, L. I., a five volume set of "Protective and Decorative Coatings" by the late Dr. J. J. Mattiello. McNabb received the award because of excellence in paint courses and for writing an outstanding research paper. F. S. Greenawald, center, represents the Nuodex Products Co., sponsor of the prize which is awarded annually to colleges with courses in paint technology.

CLARIFY VARNISH and LACQUER with...

SPARKLER horizontal plate FILTERS



Model 18-S-12 Varnish Filter in mildsteel (steam jacketed)

Every varnish maker can (and most of them do) use a Sparkler Filter to improve the clarity and brilliance of varnishes, lacquers and other clear liquids by removing "fish-eyes," skins, and other incidental solids and semi-solids.

We invite correspondence on any special problem related to either of the above processes. Our engineers are ready to give you the benefit of years of experience in this field.

SPARKLER MANUFACTURING COMPANY, Mundelein, Illinois

PATENTS

Conducted by

Lancaster, Allwine & Rommel

PATENTS AND COPYRIGHTS

424 Bowen Building, Washington, D. C.

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired to Lancaster, Allwine & Rommel.

Plasticizers for P V C

U. S. Patent 2,538,254. Robert J. Lee, La Marque, Tex., and Robert H. Reiff, New Cumberland, Pa., assignors to Pan American Refining Corporation, Texas City, Tex., a corporation of Delaware.

A resin of reduced corrosion tendencies selected from the group consisting of polyvinyl chloride resin and polyvinyl chloride-acetate copolymer resin containing between about 80 and about 95 percent of polyvinyl chloride and between about 20 and about 5 percent of polyvinyl acetate, said resin comprising between about 15 and about 100 percent by weight, based on said resin, of a phenyl naphthyl ketone selected from the group consisting of unsubstituted phenyl naphthyl ketones and unsubstituted phenyl methylnaphthyl ketones.

Coatings for Flexible Surfaces

U. S. Patent 2,537,017. Gerald R. Barrett, Winchester, Mass., assignor to Monsanto Chemical Company, St. Louis, Mo., a corporation of Delaware.

A coating composition for flexible surfaces comprising as essential film forming materials: (1) polyvinyl butyral; and (2) a copolymer consisting of the copolymerization product of a secondary alkyl half ester of an ethylene α,β-dicarboxylic acid selected from the group consisting of maleic and fumaric acids, wherein the alkyl radical contains from 6 to 10 carbon atoms, and styrene, said half ester and styrene being copolymerized in a molal ratio between 1:1 and 1:2; and a plasticizer for said film-forming materials.

Allyl Esters

U. S. Patent 2,536,568. Maxwell A. Pollack, Denville, N J., assignor to E. F. Drew & Co., Inc., New York, N. Y., a corporation of Delaware.

A method of making modified oils having valuable film forming and drying properties which comprises heating a drying oil to a temperature in the neighborhood of 300° C. for a sufficient length of time to cause partial polymerization of unsaturated acids to take place, alcoholizing said oil so polymerized with an unsaturated monohydric alcohol having 3 to 10 carbon atoms, and heating said unsaturated alcohol ester at about 300° C. for a sufficient length of time to increase the viscosity of said product.

Coating Composition

U. S. Patent 2,537,017. Gerald R. Barrett, Winchester, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo., a corporation of Delaware.

A coating composition for flexible surfaces comprising as essential film forming materials: (1) polyvinyl butyral; and (2) a copolymer consisting of the copolymerization product of a secondary alkyl half ester of an ethylene α,β-dicarboxylic acid selected from the group consisting of maleic and fumaric acids, wherein the alkyl radical contains from 6 to 10 carbon atoms, and styrene, said half ester and styrene being copolymerized in a molal ratio between 1 : 1 and 1 : 2; and a plasticizer for said film-forming materials.

HERCOLYN®

Liquid Resins to Relieve Plasticizer Shortages

ABALYN®

Hercules "Hercolyn" and "Abalyn" are liquid resinous esters of low vapor pressure, good alkali resistance, and wide compatibility. Both impart gloss and flow to compositions in which they are used.

"Hercolyn," hydrogenated methyl ester of rosin, is well established as a secondary plasticizer with both oil-type and chemical plasticizers in many lacquer compositions.

"Abalyn," methyl ester of rosin, is more reactive due to the presence of double-bond structures. It is frequently used in heat-converted compositions, for example in conjunction with phenol-aldehyde condensations to impart resistance to embrittlement.

Send for technical information and testing sample.

HERCULES POWDER COMPANY Synthetics Dept., 926 Market St., Wilmington, Del.

IC51-3

How Williams can help *you* improve the performance of Automotive Priming Coats

LASTING BEAUTY . . .
a car's best advertisement!

As you know, the life and beauty of automotive top coats depend largely on the quality of your priming coats.

Water-resistance, adhesion, hold-out, shrinkage, gloss and durability . . . these are the essential qualities of priming coats which enable enamel top coats to retain original beauty despite years of wear.

To help you obtain these qualities, Williams is prepared to supply you with iron oxide pigments CUSTOM-MADE to the requirements of your coating system. These CUSTOM-MADE pigments . . . in combination with your carefully prepared vehicles . . . can often substantially improve the performance of your primers, primer-surfacers and surfacers.

If you have a primer problem . . . now, or in the future . . . please write Dept. 23, Easton, Pa. Our technical service laboratories will gladly cooperate with you in working out a good solution.

WILLIAMS
COLORS & PIGMENTS

C. K. WILLIAMS & CO.
Easton, Penna. • Emeryville, Cal. • E. St. Louis, Ill.

108 SHADES AND TYPES OF IRON OXIDE PIGMENTS

HELLIGE VARNISH COMPARATOR

EMPLOYING **NON-FADING GLASS COLOR STANDARDS**

Modern Apparatus for Precision and Accuracy in Color Determinations of Varnish, Oils, Resins, Nitro-Cellulose Lacquers, and Similar Transparent, Colored Liquids.

Write for Catalog No. 605-40V

HELLIGE
INCORPORATED
3718 NORTHERN BLVD., LONG ISLAND CITY 1, N.Y.
HEADQUARTERS FOR COLORIMETRIC APPARATUS

on the fighting fronts . . .
FALKYD RESINS insure perfect performance in your products!

Backed with an outstanding World War II service record, Falkyd Resins step to the front in the mobilization program. As key raw materials, they play a vital part in the manufacture of a wide variety of finishes and protective coatings including those for tanks, ships, ammunition, aircraft and jeeps.

If you have an Army or Navy Specification to meet . . . the facilities of our laboratory and staff are at your disposal . . . to help find the right Falkyd Resin to meet your specification requirement.

WRITE . . . WIRE or PHONE TODAY!

FALK & COMPANY
PITTSBURGH 30, PA.
PLANTS: EDGEWATER, N. J. • PHILADELPHIA, PA. • CARNEGIE, PA. • MINNEAPOLIS, MINN.

Coating Composition

U. S. Patent 2,537,018. Gerald R. Barrett, Winchester, Mass., assignor to Monsanto Chemical Company, St. Louis, Mo., a corporation of Delaware.

A copolymer consisting essentially of the copolymerization product of a polymerizable vinyl compound having the general formula: R—CH=CH_2, where R is a radical selected from the group consisting of a phenyl group, a chloro substituted phenyl group and a methyl substituted phenyl group, and a secondary alkyl acid ester of an ethylene α,β-dicarboxylic acid selected from the group consisting of maleic and fumaric acids, wherein the alkyl group contains from 4 to 12 carbon atoms, said vinyl compound and secondary alkyl acid ester being copolymerized in a molal ratio of about 1:1 to 2:1.

Acetone Formaldehyde Resins

U. S. Patent 2,538,884. Conrad F. Schrimpe, Woodbridge, N. J., assignor, by mesne assignments, to Union Carbide and Carbon Corporation, a corporation of New York.

Condensation product of acetone and formaldehyde containing unreacted formaldehyde and methylol groups modified by reaction under basic conditions with an organic compound selected from the group consisting of aliphatic ketones having active alpha-hydrogen atoms, monohydric phenols having hydrogen atoms in at least one of the active nuclear positions and linear methylene-linked derivatives of the said phenols in amount sufficient to combine with unreacted formaldehyde and methylol groups present in the acetone-formaldehyde condensation product.

Fire Retardant Coating

U. S. Patent 2,542,721. Robert M. Stafford, Somerville, N. J., assignor to Johns-Manville Corporation, New York, N. Y., a corporation of New York.

A weather proof and fire-retardant coating consisting essentially of asphalt having a softening point of at least about 170° F., and finely divided filler material uniformly distributed throughout said asphalt and comprising 5–30% by weight of cellular perlite having a density within the range of 3–12 pounds per cubic foot.

Heat-Resistant Coating

U. S. Patent 2,538,974. Ronald A. McGlone, Flint, Mich., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware.

A heat resistant coating composition, comprising a non-oxidizable coumarone-indene resin which is a viscous liquid distilling entirely at 572–698° F., a plasticizer, ethyl cellulose, xylol, and a substantial amount of aluminum pigment and lead naphthenate, the ratio of metal in the lead naphthenate to aluminum pigment being from 1 : 8 to 5 : 8.

Aqueous Emulsion Paint

U. S. Patent 2,537,055. Francis Patrick Hiron and Philip James Garner, Chester, England, assignors to Shell Development Company, San Francisco, Calif., a corporation of Delaware.

An aqueous emulsion paint comprising an aqueous emulsion of a neutralized mixture of substantially oil-free naphthenic acids and associated film-forming constituents from a naphthenic acid-containing petroleum fraction boiling above 200° C. at 0.5 mm. mercury pressure, together with a dispersed pigment.

LANCASTER, ALLWINE & ROMMEL
REGISTERED PATENT ATTORNEYS
●
Suite 424, 815—15th St., N.W.
Washington 5, D. C.
Patent Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions.
Booklet and form "Evidence of Conception" forwarded upon request.

COUMARONE RESINS
PETROLEUM RESINS
ALKYLATED PHENOL RESINS
PLASTICIZING OILS
COAL-TAR SOLVENTS AND OILS
NEUTRAL AND SHINGLE STAIN OILS
RUBBER RECLAIMING OILS
CHEMICAL SPECIALTIES

THE NEVILLE COMPANY **NEVILLE** PITTSBURGH 25, PA.

Plants at Neville Island, Pa., and Anaheim, Cal. A39

EVALUATION OF VINYLS

(*From page 22*)

formulations. Therefore, subsequent applications strike into the undercoat, no matter how long it has dried, to form, in effect, a single heavy coat.

10. Presumably because they undergo little chemical change, deposited vinyl films seem to lose their flexibility and degrade more slowly than films which dry by oxidation and polymerization.

11. In immersion tests, the original wash primer employing insoluble zinc chromate as the pigment is as effective as any of the later modifications in reducing the blistering tendency of subsequently applied paint systems. This is true not only for wash primed vinyl copolymer systems but for systems composed of a wash primer followed by oleoresinous paints.

12. Wash primers used as metal conditioners under a number of phenolic systems were generally more effective in reducing blistering than phosphoric acid wash pre-treatments of the brush-on type employed in field work.

13. Although little background information is available to substantiate the following statement, it is believed that blast cleaning of structural steel surfaces is advisable if the potential durability of vinyl type coatings is to be realized.

It must be pointed out that vinyl coatings have one serious disadvantage in comparison with oleoresinous materials. This disadvantage stems from their low solids content which, in effect, requires that approximately 2½ tmies as much liquid volume of vinyls must be applied to obtain a given film thickness. Practically, this means that a relatively large amount of expensive solvent must be used in order to apply the vinyl materials and that larger volumes of materials must be handled and sprayed in order to coat a given area. These factors combine to make vinyl coatings appreciably greater in cost than oleoresinous materials. These higher material and application costs may be more than offset, however, by savings accruing from the rapid drying characteristics of the vinyl paints and consequent improvement in coating schedules.

Although the field experience of the Rock Island District has not yet been of sufficient duration to assure that the vinyl coatings are equal or superior to phenolics in underwater durability, there is no evidence to the contrary. On the basis of the durability of vinyl coatings thus far determined together with the advantages accruing from their rapid drying time, the Rock Island District has coated about a million square feet of sandblasted structural steel surfaces, subject to immersion in fresh water and abrasion, with various copolymer systems. The forthcoming 3 or 4 years should bring forth some vital information concerning this type of coating in underwater exposure.

E. Jobbins of Hardesty Dies

Edward Jobbins, a director of W. C. Hardesty Company, New York, manufacturers of fatty acid products, died April 21st in Washington, D. C. He was 64 years of age at the time of his death. Mr. Jobbins was serving as a consultant for the Office of Price Stabilization.

•

General Mills Names Wheeler To Direct Research Program

Dr. Donald Wheeler, director of technical sales and service for General Mills Chemical Div., has joined the company's research laboratories. He will direct a basic research program on the chemistry of drying oils and will act as consultant on all General Mills' chemical operations.

NITROPARAFFINS

Ideal medium boiling solvents

for

NITROCELLULOSE

CELLULOSE ACETATE

CELLULOSE ACETATE BUTYRATE

CELLULOSE TRIACETATE

VINYLS

THE NITROPARAFFINS have thoroughly demonstrated their usefulness to the protective-coating industry in the formulation of nitrocellulose, cellulose acetate, cellulose triacetate, and cellulose acetate butyrate lacquers and adhesives. In addition, they have found use in specialty products based on various vinyl-type resins.

The NP's possess strong solvent power for nitrocellulose and the cellulose acetate family of film formers, perfectly filling the demand for good, medium-boiling, flow-promoting solvents in these fields.

Look the NP's over again—in the light of increased availability and decreased prices. A request on your company letterhead will promptly bring you additional data.

CSC

INDUSTRIAL CHEMICAL DIVISION

COMMERCIAL SOLVENTS CORPORATION

17 East 42nd Street, New York 17, N. Y.

"lead" passes the *"FRIED EGG"* test*

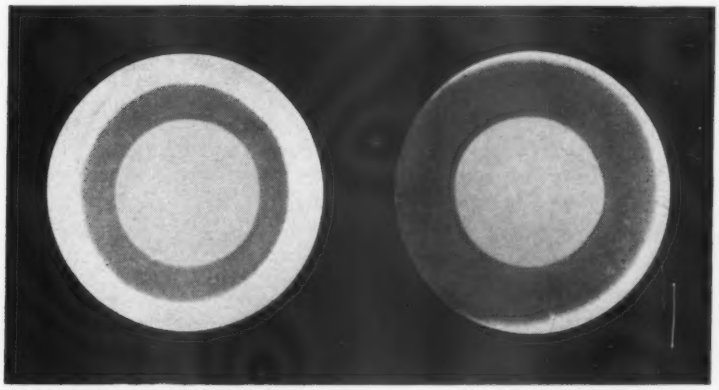
—that's why house paints containing "LEAD" have *extra* durability

The "Fried Egg" test is an interesting and striking comparison of the oil retention properties of a paint film. This simple experiment is carried out by dropping a controlled quantity of paint on a piece of filter paper and observing the area stained by the oil released from the paint. From the illustration, it can be clearly seen that non-"lead" paints give up considerably more of the oil vehicle than those containing substantial portions of white lead.

The faculty of white lead to retain the oil in the paint film is a prime requisite of durable house paint films. Without lead pigments, more of the oil binder tends to penetrate the wood or other porous substrata, robbing the oil from the protective film — with consequent early erosion or severe chalking.

Oil-retention is but one of the several reasons why white lead is so desirable in paint. Use enough of it to take advantage of all the qualities that lead pigments impart. You as the manufacturer will know you are producing a better—more reliable product. And white lead pigments in paint can't be beat as a valid argument to promote sales.

Valuable Reference Material: Write for data sheets on paint formulations to meet specific end requirements. *Lead Industries Association, 420 Lexington Avenue, New York 17, N. Y.*



Ready-Mixed White Lead Paint — Non-Lead Paint

Photograph of laboratory test aptly described as the "Fried Egg" test because of resemblance of the end result to an egg fried "sunnyside up."

* *Federal specification TT-P-141b, method 442.1—absorption test.*

"LEAD" LENGTHENS THE LIFE OF PAINT BECAUSE:

It Stabilizes—neutralizes acidic compounds resulting from the decomposition of the vehicle—prevents the film from becoming soft or liquefying.

It Plasticizes—forms lead soaps which increase film flexibility.

It Strengthens—flexible, spiney crystals in lead soaps mechanically reinforce the film and increase elastic strength.

It Resists Water—paint films with an optimum lead pigment content absorb only a small fraction as much water as they otherwise would.

It Limits Oil Penetration—more of the vehicle remains in the film where it is needed; less is absorbed in the substrata.

It Improves Appearance—by controlling chalking and inhibiting mildew.

TECHNICAL Bulletins

SYREX WAX

Technical bulletin No. 222, "Syrex 200-Properties and Formulations" contains chemical and physical properties of Syrex 200 lustrous wax for use in polishes, protective coatings and other industrial formulations which require a high melting-point wax component.

Included are extensive compatibility data with natural and synthetic waxes and related materials. Solubility curves are given, using a wide variety of commercial solvents.

Formulae have been developed using a wide selection of wax combinations which include formulae containing no natural wax. Additional formulae emphasize film properties, such as water-spot resistance and advanced leveling action. A step-wise manufacturing procedure for emulsion polishes is also given.

For a copy, request Technical Bulletin No. 222, Velsicol Corporation, 330 East Grand Ave., Chicago 11, Ill.

PLANT MAINTENANCE

A discussion of recent developments in problems of plant maintenance, "Techniques of Plant Maintenance—1951," has been published by Clapp & Poliak, Inc., of 341 Madison Ave., New York 17, N. Y., the management of the Plant Maintenance Show held in Cleveland last January. The new volume is a companion piece to "Techniques of Plant Maintenance—1950," and contains the proceedings of the Plant Maintenance Conference held in conjunction with the show.

Subjects covered include preventive maintenance, inspection procedures and frequencies, records and reports, training personnel for maintenance, organization and management for maintenance, maintenance costs, incentive payment of maintenance workers, planning and scheduling maintenance operations, applied lubrication in industry, housekeeping, painting and decorating, floors and standards of sanitation. Price $6.00 postpaid.

GRINDING OILS

Archer 371 and 381 have been developed for use in modern low-oil-content quality house paint. They are pure linseed grinding oils fortified with a carefully polymerized linseed oil.

The bulletin tells how the exact properties of heat polymerized and refined linseed oils needed to give optimum results were obtained only after many years of durability studies in various house paint formulations.

Constants, characteristics and a number of tested formulas using Archer 371 and 381 are included in this bulletin. Copies may be obtained by writing to Archer-Daniels-Midland Company, Box 839, Minneapolis 2, Minnesota.

RESINS FOR MILITARY PAINT SPECIFICATIONS

Guide provides a ready reference of applicable government paint specifications for which various Aroplaz resins may be used to meet exacting performance characteristics. Guide may be obtained from the U. S. Industrial Chemicals, Inc., 60 E. 42nd St., New York 17, N. Y.

PAINT MILLS

The J. M. Lehmann Company, Inc. of Lyndhurst, New Jersey has issued a data sheet, featuring the Lehmann Models 913-A and 813-A Vertical 3-Roll Paint Mills. This data sheet lists the many features of this mill and the general specifications.

Short on Titanium Pigments?

—extend your supply
—maintain production and quality
—save money

using DICALITE "L" or WHITE FILLER

Dicalite* inert extenders not only can replace part of scarce titanium pigments, but can improve certain qualities of inside and outside house paints. Dicalite increases the hiding power of prime pigments—in other words, produces a given hiding power in pigmented coating with less prime pigment, and without harm to the color. In addition, Dicalite has a strengthening effect on the film; improves brushing, leveling and washability.

Three grades, Dicalite L-1, L-2 and L-10, are available. The principal difference is in particle size, with 8%, 3% and 15% respectively retained on 325 mesh screen. Dicalite White Filler is practically the same material, but with only 1% retained on 325 mesh screen. All are white, high brightness materials.

Send for Your Copy of Bulletin C-20

*Reg. U.S. Pat. Off.

DICALITE DIVISION, GREAT LAKES CARBON CORPORATION

NEW YORK 17, N. Y. • CHICAGO 13, ILL. • LOS ANGELES 17, CALIF.

FORMULATION FOR SPEC FINISHES

Sixteen suggested formulations to meet U. S. Government paint specifications are offered to paint manufacturers and paint technologists in a 32-page booklet prepared by Rohm & Haas Company, Washington Sq., Philadelphia 5, Pa.

Formulations cover: Federal Specification TT-E-485B, a rust-inhibiting olive drab enamel for drums and other metal products.

TT-E-489, a synthetic gloss enamel for exterior and interior surfaces, TT-E-506B, an interior gloss enamel, white or with tints, TT-E-508, a semi-gloss interior enamel, white or with tints, TT-P-636, a synthetic primer for ferrous metal and wood surfaces, TT-R-266, alkyd resin solutions.

Quartermaster Corps Tentative Specification O.Q.M.G. No. 167, protective interior lacquers for steel containers for fuels and lubricants.

JAN-P-72, a lacquer-resisting synthetic primer, JAN-E-480, a phenol or urea formaldehyde baking enamel, MIL-E-5557, a black heat-resisting glyceryl phthalate enamel, MIL-P-6889A, a zinc chromate primer for aircraft use, MIL-V-6894, a glyceryl phthalate spar varnish, MIL-S-10181 (Ord), a lacquer type sanding surfacer, MIL-E-15090, a light gray equipment enamel (Formula III), Amendment 1.

Bureau of Ordnance Specification 52-E-13 (Ord), a rapid drying semi-gloss enamel.

Bureau of Aeronautics Specification 52-L-26 (Aer.), a low water-sensitivity cellulose nitrate lacquer.

LACQUERS AND SEALERS

Furniture lacquers and sanding sealers are described in a new bulletin prepared by the Merrimac Div. of the Monsanto Chemical Co., Everett, Mass. Pointing out that the finest wood and best design are wasted under an inferior finish, the bulletin sets forth qualifications for clear and matte finish lacquers. Properties discussed include percent solids, application, gloss, flexibility, durability, and resistance to scratching, printing, alcohol, heat, cold and moisture.

CHEMIGUM

A new technical booklet on Chemigum, a nitrile synthetic rubber produced by The Goodyear Tire & Rubber Company, has been prepared and released.

In announcing its availability, H. R. Thies, manager of Goodyear's Chemical Division, said the booklet lists properties, compounding techniques and applications in a wide range of products.

Use of the material in general and pressure adhesives is also included.

ABRASION TESTING

Bulletin No. 5003 describes "Model 140" standard abrasion testing set manufactured by the Taber Instrument Corp., 111 Goundry St., North Tonawanda, N. Y.

DECORATING STYRENE

Decorative treatments for Lustrex styrene plastic are described in a new, 28-page, illustrated booklet prepared by Monsanto Chemical Company's Plastics Division, Springfield, Mass.

Post-molding processes discussed in the booklet cover metalizing, lacquering, all types of stamping and printing, and destaticizing. Operating methods and processes are illustrated by charts and photographs.

Advantages of lacquering, as well as preparation of plastics surfaces, lacquering methods and operating methods are described fully. Metalizing methods include electroplating, spraying, vacuum metalizing and cathode sputtering.

formulate with

ETHYL BUTYL KETONE

A DISPERSANT—Aids resin dispersion in vinyl organosols. Medium evaporation rate of ethyl butyl ketone retards film cracking and facilitates fusion.

A SOLVENT—Effective solvent for VINYLITE resin VYHH. Particularly useful in nitrocellulose lacquers and synthetic coatings requiring a medium-to-high-boiling ketone.

PHYSICAL PROPERTIES

Formula	$C_4H_9COC_2H_5$
Boiling Point at 760 mm. Hg	147.8°C.
Toluol Dilution Ratio at 20°C. ½ sec. R. S. Nitrocellulose	2.6
Evaporation Rate (Butyl Acetate = 100)	40

Available in commercial quantities

CARBIDE AND CARBON CHEMICALS COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC

30 E. 42nd St., New York 17, N.Y. Offices in Principal Cities
In Canada: Carbide and Carbon Chemicals, Limited, Toronto

"Vinylite" is a registered trade-mark of Union Carbide and Carbon Corporation

INTERIM REPORTS ON NEW RAW MATERIALS

This constitutes the May 1951 interim report of the Materials Committee of the Federation of Paint and Varnish Production Clubs, William P. Colio, chairman. New developments since the November 1950 Convention are discussed.

Solvents: Carbide and Carbon are now supplying Ketosols 25 and 75. These are mixtures of phenyl methyl carbinol and acetophenone. It is claimed that the high boiling solvents have a pleasant odor, high solvency and low cost.

Celanese Corporation of America have announced 1,3 Butylene Glycol. It is a new high boiling polyhydric alcohol useful as a solvent and as an intermediate for the production of rosin esters, plasticizers and resins.

Pigments: The DuPont Company have announced Maroon Gold RT-608-D (yellow shade) and Maroon Gold RT-665-D (blue shade). For the first time bright, yellow tone, durable and non bleeding pigments suitable for automotive finishes have been made available. Both pigments are exceptionally light fast in lacquer and baking or air dry alkyd enamels. They will tolerate large amounts of non leafing aluminum, producing bright red and maroon metallics with yellow undertone. They may be blended with other durable pigments to produce a wide range of shades possessing striking two-tone effects.

Oils: H. B. Davis Company are now producing Lectung Oil, a new reinforcing oil. This is a blend of oils with Tung Oil to produce an oil with a wide range of uses such as ready mixed paint for wood, fillers, concrete, stucco, sealers, shingle stains, etc.

Falk and Company have just begun the commercial production of three new oils, Falkowood RT Pale, Falkowood 48 and Falkowood 51. These are intended as total or partial wood oil replacement. All are chemically treated oils of the alkyd type. The RT is based on fish oil whereas 48 and 51 are based on linseed.

Resins and Plasticizers: Hercules now has available B-56 Resin. It offers varnish makers a product that will produce a semi-alkyd by merely heating with a drying oil in the processing kettle. The sealing properties of some B-56 semi-alkyds suggest their use in primer sealers and flats. Claims are also made for low cost interior whites of good color, good brushability, over night through dry and fully hard films.

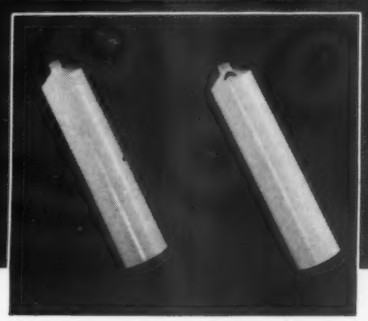
Armour and Company are offering Neo-Fat D-242 as a low cost quality rosin replacement. D-242 is a mixture of rosin acids and valuable fatty acids in the approximate ratio of 70%–30%. The fatty acids are linoleic and oleic acids in almost equal proportions.

Three new alkyd resins have been introduced by General Electric. These are 2522, 7300 and 7310. Resin 2522 is a fast drying, hard, tough resin with good adhesion, gloss and color retention, flexibility, chemical resistance and durability. Resin 7300 is a general purpose resin with improved gloss retention for use in architectural finishes including in-

(*Turn to page 40*)

The sign of ECONOMY for
HYDROCARBON RESINS
PANAREZ
Everyone has problems. We sympathize with yours, and suggest that if you need quality resins, it is important for you to investigate economical PANAREZ resins today. Those production problems don't seem quite so big—when PANAREZ resins are specified.
PAN AMERICAN Chemicals
PAN AMERICAN CHEMICALS
DIVISION
Pan American Refining Corp.
122 EAST 42nd STREET
Plant
NEW YORK 17, N. Y.
Texas City, Texas

Why the crumple test won't crack EPON® RESIN finishes!



TWO ALUMINUM TUBES . . . *the one on the right coated with a standard white enamel . . . the left-hand tube coated with an Epon enamel.*

These enameled toothpaste tubes looked alike originally. But after a brutal "accordion" test the Epon resin finish on one remained smooth and unharmed . . . even on the sharp corners! The second tube, coated with a standard widely-used enamel, cracked and flaked off.

The secret of this adhesion lies in the polar nature of the Epon molecule. So outstanding is this property that even an unprimed zinc die casting takes a hard durable finish with a single coat of an Epon resin enamel.

This property plus excellent chemical resistance and flexibility make Epon resins unusually attractive.

* * *

Although the demand for Epon resins is ahead of present production, increased capacity is on the way. Now is the time to develop your formulations based on these new resins. Experimental quantities may be obtained for evaluation.

SHELL CHEMICAL CORPORATION

CHEMICAL PARTNER OF INDUSTRY AND AGRICULTURE

Eastern Division: 500 Fifth Avenue, New York 18
Western Division: 100 Bush Street, San Francisco 6

Los Angeles • Houston • St. Louis • Chicago
Cleveland • Boston • Detroit • Newark

IN CANADA

Shell Oil Company of Canada, Limited
Toronto • Montreal • Vancouver

INTERIM REPORT

(*From page 38*)

terior and exterior gloss enamels. Resin 7310 is a rapid, tough-baking vehicle for industrial type finishes.

The Goodyear Tire and Rubber Company have recently added Pliolite Base 85-S5 to their line of pigment-in-resin dispersions. The new base was developed to improve the quality of their red bases and will replace Pliolite Base 35-S5. Another new base is Pliolite Base 66A-S5 which consists of 75% Pliolite S5 and 25% Du Pont Monastral Blue Lake BL-282-D. The new base replaces 66-S5 and gives excellent color stability by eliminating the tendency toward pigment crystallization and flocculation previously found in coatings prepared from Pliolite Base 66-S5. Since the Monastral Blue pigment is resistant to acids and alkalies, 66A-S5 can be used in chemically resistant coatings with minimum risk of color change. More recent tests indicate that 66A-S5 has about one and one-half times the tinting strength of 66-S5.

U. S. Industrial Chemicals have placed several new resins on the market. Aroflint 131 is based on a soluble type phenolic resin which cures or dries at room temperature by chemical reaction. Applied films dry tack-free in 30 to 40 minutes. Films are extremely hard and tough as well as mar, chemical and solvent resistant. Coatings are uneffected by heat hence softening will not occur if hot objects are placed on the surface. Aropols 865-P-50 and 880-X-60 are copolymers of alkyd type resins with selected monomeric materials. Aropol 880-X-60 is shorter in oil length hence is faster drying though less flexible. Both resins are pale in color and have excellent color retention, being superior to most alkyds in this respect. They have unusual toughness and abrasion resistance and possess unusually good flexibility over long periods of aging. Arochem 542 is a new type resin produced specifically for use in lacquers. This resin shows superior cold check resistance, print resistance and ease of sanding and rubbing. Arochem 460 is a very high melting point resin with extreme hardness, good color, high gloss and toughness. It is useful as a component of no rub polishes and as a vehicle for steam set inks.

General Mills, Inc. have announced Special Wheat Protein. Aqueous dispersions of this protein have relatively low viscosities at high solids concentrations. Dispersions containing up to 70% solids may be made. Some of the advantages of Special Wheat Protein are ease in dispersibility, resistance to putrefaction and less tendency to foam. This material is useful in replacing zein.

General Mills, Inc. are preparing to announce a new series of "Resinous Alcohols." These are neutral esters of glycerine, containing esterified rosin and unsaturated fatty acids with 4.5 to 5.0% free hydroxyl groups. They will have application in varnish, alkyd resin and ester gum production. The partially esterified glycerine may make them useful as dispersing agents.

Miscellaneous: The National Lead Company have developed two new stabilizers for vinyls. Dutch Boy CS-137 is a sodium-barium complex and Barinac is a barium ricinoleate.

A line of Witall Driers of the tal-

NOW AVAILABLE IN THE U. S. FOR THE 1st TIME!

LEAD CYANAMIDE DK825

THE EFFECTIVE AND ECONOMICAL ANTI-RUST PIGMENT WITH A LEAD BASE

Advantages of the finished paint:

1. Low specific gravity. (Great covering power. Ease in painting and spraying).
2. No settling or thickening. No loss of paint and excellent resistance to storage influences.
3. Extremely economical. (As a result of reduction in material costs and time of application).
4. Highly effective protection against corrosion through its strong and durable properties as a basic coat.
5. Especially suitable as a basic or top coat.
6. Designed for blending with linseed oil varnish and numerous other binding agents.

EFFECTIVENESS PROVED FOR OVER 15 YEARS IN EXTENSIVE EUROPEAN TESTS

For further details, technical data, samples, etc., apply to

MILLMASTER CHEMICAL CORPORATION

420 LEXINGTON AVENUE **NEW YORK 17, N. Y.**

U. S. Selling Organization for the manufacturers:

DUISBURGER KUPFERHUETTE, DUISBURG, GERMANY

DUISBURGER KUPFERHUTTE · DK ·

late type are available from Witco Chemical Co. They also market two butyl stearatates. C-1 is a cosmetic grade and T-1 is a technical grade. Both find use as plasticizers for nitrocellulose and rubber hydrochloride and improve moisture resistance of films. Corrosion resistance is also claimed.

Shell Chemical Co. are now producing commercial quantities of TBBA, a p-tertiary butyl benzoic acid. This is a high purity aromatic acid for producing alkyds with improved gloss, hardness, color retention and light stability.

Raybo Chemical Co. are offering Raybo 3 as an antisilking an antiflooding agent for colored enamels.

Baker Castor Oil Co. have announced a line of ricinoleates which give properties equal to or better than the stearates. These include barium, cadmium, magnesium and zinc ricinoleates.

Tennessee Eastman Co. are offering triethyl phosphate as a plasticizer for water paints and as a penetrating agent for paint, varnish and lacquer removers.

Syloid 308, a synthetic silica of controlled particle size, supplied by the Davison Chemical Corp. is said to have a high flatting efficiency and offers excellent control over the degree of matte obtained.

SYLOID 308 is a new flatting agent of tremendous importance for flat-finish lacquers. This synthetic silica is inert and insoluble, with particle size minutely controlled, to assure uniformity. Every shipment is exactly like the previous, and so the results are always the same. Use SYLOID 308 and realize new high standards in flatting efficiency, mill room economy, and film characteristics. Use our technical advisory staff. Write for information. *T. M. Reg. Applied For

Progress through Chemistry

THE DAVISON CHEMICAL CORPORATION

Baltimore 3, Maryland

CALENDAR OF EVENTS

Aug. 16. National Association Processors, Edgewater Beach Hotel, Chicago, Ill.

Sept. 6–8. American Soybean Association, Fort Des Moines Hotel, Des Moines, Iowa.

Oct. 22–24. Thirteenth Annual Forum of the Packaging Institute, Hotel Commodore, New York City, N. Y.

Oct. 23. Association of Consulting Chemists and Chemical Engineers, Hotel Shelburne, New York City.

Oct. 29–31. National Paint, Varnish and Lacquer Association Convention, Chalfonte-Haddon Hall, Atlantic City, N. J.

Nov. 1–3. Federation of Paint and Varnish Production Clubs, Chalfonte-Haddon Hall, Atlantic City, N. J. Paint Industries Show, Oct. 31–Nov. 3.

CLASSIFIED ADVERTISEMENTS

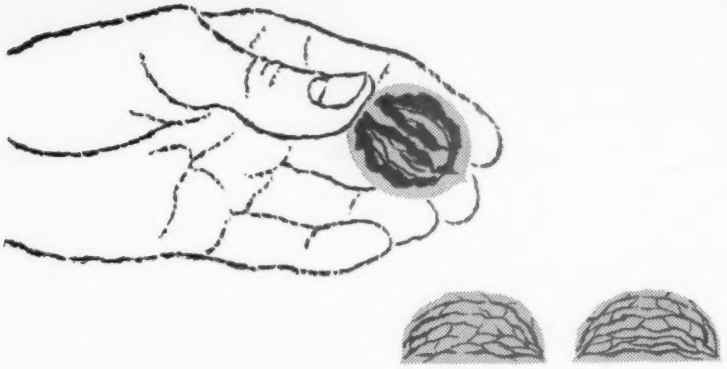
Rates: $.20 per word, except those seeking employment, for which rate is $.10 per word. Minimum: ten words. Address all replies to Box Number, c/o Paint and Varnish Production, 855 Avenue of the Americas, New York 1, New York.

Coating Chemist: Experienced Coating Chemist wanted for technical service contact work for a large pigment manufacturer. Box 110. *Paint and Varnish Production.*

Paint Chemist Wanted: Opening in Engineer Research and Development Laboratories for a paint chemist with well rounded background in formulation. Degree in chemistry or chemical engineering. Degree requirement may be waived if applicant has sufficient working experience. Salary $4600, plus. Box 111, *Paint and Varnish Production.*

Paint Chemist: Paint chemist desires position in formulation or production. 15 years experience in paints and water proofing compounds. Box 112, *Paint and Varnish Production.*

Coating Chemist Wanted: Chemist for Organic Coatings. Laboratory experience not necessary but desirable. Location southwest Ohio. Box 113, *Paint and Varnish Production.*



Purecal didn't just happen

Sure, Purecal* will save you more titanium dioxide than any other extender-pigment. And it will do that while keeping the same brightness, opacity and hiding power.

But there's more to the story than that. To begin with, we make Purecal by *controlled precipitation* of calcium chloride and sodium carbonate. Temperature, pH, proportion of reactants, rate of addition and other variables are controlled automatically. So that the operator can produce any given particle size—even smaller than the finest ground limestone.

Which particle size? Well, here's how we arrived at Purecal M. We varied particle sizes over a wide range, checked them with an electron microscope. We compared each individual "size range"—one against the other—to find which produced the most opacity, brightness and hiding power. We found the size (.2 microns—same as titanium dioxide) that did that—and that size is Purecal M.

P. S.—Have you got our free charts comparing Purecal with other light colored pigments? Better write today. *Trade-mark

Soda Ash • Caustic Soda • Bicarbonate of Soda
Calcium Carbonate • Calcium Chloride • Chlorine
Hydrogen • Dry Ice • Synthetic Detergents
Glycols • Carbose (Sodium CMC) • Ethylene
Dichloride • Propylene Dichloride • Aromatic
Sulfonic Acid Derivatives • Other Organic
and Inorganic Chemicals

Wyandotte
REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION
Wyandotte, Michigan • Offices in Principal Cities

MICA WATER-GROUND "At Its Best"

Every Paint manufacturer using Water-Ground Mica should be using "CONCORD" because:

1—It is ground exclusively from a clean, white Muscovite Mica scrap imported from India and Africa.
2—It is whiter and purer.
3—It is strictly competitive in price.

Send for samples and prices

CONCORD MICA CORPORATION
35 Crescent Street - : - Penacook, N. H.
"Pioneers in producing Mica for Paint"

ADVERTISER'S INDEX

Advance Solvents & Chemical Corp.	June
American Can Co.	May
American Cyanamid Company	May
American Zinc Sales Co.	3rd Cover
Atlas Electric Devices	June
Atlas Powder Company	June
Bakelite Company, a Division of Union Carbide and Carbon Corporation	June
The Baker Castor Oil Co.	June
Barrett Div., Allied Chemical & Dye Corp.	June
Binney & Smith Co.	June
Carbide & Carbon Chemicals Div., Union Carbide & Carbon Corp	37
E. W. Colledge, G.S.A., Inc.	June
Commercial Solvents Corp.	34
Concord Mica Corp.	42
Continental Can Company	June
Coors Porcelain Co.	3
Cuno Engineering Co.	25
The Davies Can Co.	June
The Davison Chemical Corp.	41
Dicalite Division, Great Lakes Carbon Corp.	36
Duisburger Kupferhuette	40
Edgar Bros. Co.	26
Elgin Manufacturing Co.	June
The English Mica Co.	June
Falk & Co.	32
A. Gross & Company	June
W. C. Hardesty Co., Inc.	16
Hellige, Inc.	32
Hercules Powder Co.	31
Landes, Zachary & Peterson	3
Lead Industries Association	35
Mapico Color Div., Columbian Carbon Corp.	4th Cover
Metals Disintegrating Co.	June
Millmaster Chemical Corp.	40
Naftone, Inc.	4
The Neville Company	33
Newport Industries, Inc.	Front Cover
Nuodex Products Co.	28
Pan American Refining Corp., Pan American Chemicals Div.	38
R. B. H. Dispersions, Division of Interchemical Corp.	29
Reichhold Chemicals, Inc.	2nd Cover
Charles Ross & Son Co.	June
Shell Chemical Corp.	39
Shell Oil Co.	6
Sindar Corp.	June
Sparkler Manufacturing Company	30
Sun Oil Co.	June
Titanium Pigment Corporation	15
Troy Engine & Machine Co.	June
Union Carbide and Carbon Corporation, Bakelite Company	June
Union Carbide & Carbon Corp., Carbide & Carbon Chemicals Div.	37
United Carbon Co.	June
U. S. Industrial Chemicals, Inc.	27
U. S. Stoneware Co.	May
Velsicol Corp.	23
C. K. Williams & Co.	32
Wyandotte Chemicals Corporation	42

HIGH

AZO ZZZ-22

A high oil absorption Zinc Oxide having large Acicular Particles which gives heavy body

AZO acicular lead-free zinc oxide is a superior pigment available in a wide range of oil absorptions

MEDIUM

AZO ZZZ-11

A medium oil absorption Acicular Zinc Oxide imparting exceptional weathering qualities to exterior paints

AZO ZZZ-33

A definitely Acicular type with a lower oil absorption, but chemically identical with AZO ZZZ-11 and AZO ZZZ-22

LOW

The extra durability, the finer weathering qualities that Acicular Zinc Oxide gives to paint can be obtained with AZO Acicular Zinc Oxides available in a wide range of oil absorptions to meet your requirements.

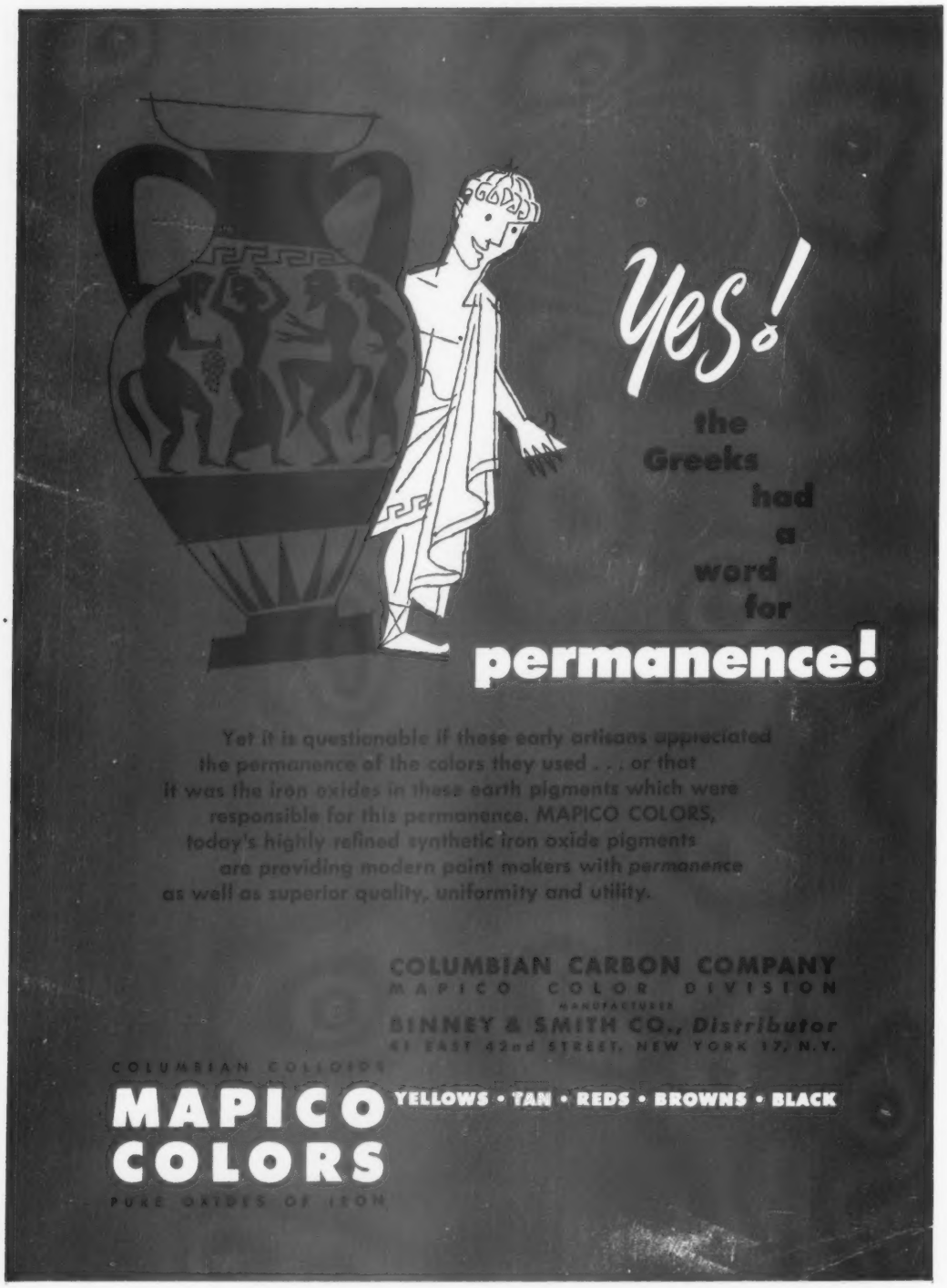
AMERICAN ZINC SALES COMPANY

distributors for

AMERICAN ZINC, LEAD & SMELTING COMPANY

COLUMBUS, OHIO • CHICAGO • ST. LOUIS • NEW YORK

AZO


Yes!
the Greeks had a word for permanence!
Yet it is questionable if these early artisans appreciated the permanence of the colors they used . . . or that it was the iron oxides in these earth pigments which were responsible for this permanence. MAPICO COLORS, today's highly refined synthetic iron oxide pigments are providing modern paint makers with permanence as well as superior quality, uniformity and utility.
COLUMBIAN CARBON COMPANY
MAPICO COLOR DIVISION
MANUFACTURER
BINNEY & SMITH CO., Distributor
41 EAST 42nd STREET, NEW YORK 17, N.Y.
COLUMBIAN COLLOIDS
MAPICO COLORS
PURE OXIDES OF IRON
YELLOWS • TAN • REDS • BROWNS • BLACK

BRANCH OFFICES AND AGENTS

Akron, Binney & Smith Co.; **Boston,** Binney & Smith Co.; **Chicago,** Binney & Smith Co.; **Dallas,** Roy A. Ribelin Distributing Co.; **Detroit,** Binney & Smith Co.; **Houston,** Roy A. Ribelin Distributing Co., **Kansas City, Mo.,** Abner Hood Chemical Co.; **Los Angeles,** Martin, Hoyt & Milne, Inc.; **Louisville,** Wm. B. Tabler Co.; **Philadelphia,** Binney & Smith Co.; **St. Louis,** J. E. Niehaus & Co.; **St. Paul,** Worum Chemical Co., **San Francisco & Seattle,** Martin, Hoyt & Milne, Inc.; **Toronto,** Binney & Smith Ltd.